Ceramics TECHNICAL

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Majolica Techniques for Artist Potters • Water Colours on Porcelain
Stacking a Wood Kiln for Colour • Imagery in Wall Tile Design
Colour at Stoneware Temperatures • A Ceramic Safari in East Africa

2

VESSEL

A Major Exhibition of Australian Ceramics Tracing the Styles in Vessel-making

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This exhibition includes pieces on loan from the Powerhouse Museum, Sydney, showing the work of potters who set a pattern in the tradition of the vessel in Australia

28 June – 21 July, 1996

Canberra School of Art Gallery,
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Curated by Peter Haynes
A fully illustrated catalogue with a comprehensive essay, detailed comment and photographs of the work will be available.
For further information contact Merryn Gates at the Canberra School of Art Gallery or the School Information Officer, Tel: 06. 249 5810

Ceramics TECHNICAL

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Alexandra Copeland

A colour test piece prepared with unfired glaze used to test colour and consistency
Photo: Andrew Clarke

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Editor Janet Mansfield
Business Manager Glenys Waller
Colour Separations Rainbow Graphics
Printing Craft Printing, Australia

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Telephone +61 (0)2 361 5286
Facsimile +61 (0)2 361 5402
E-mail colman@zeta.org.au
Internet:
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The value of skill is being debated as crafts such as pottery seek to align themselves with the fine arts. It is not that the art of the potter is not one of self-expression but it is an art form that relies on technique, on knowledge of materials and processes. The aim of this magazine is to promote skill and to further knowledge in ceramics. Perceptive writers such as Peter Dormer have struck a chord with many craftspeople. In his often quoted book, *The Art of the Maker*, Dormer advocates skill and discipline. Learning, says Dormer, takes time. The value of technical experimentation needs to be recognised.

A number of authors of articles in this issue of *CeramicsTECHNICAL* describe experiments undertaken before the skills that they have won have given them the freedom necessary to make headway with their expression of art. Maiolica is an artist's medium, says Alexandra Copeland, in the lead article in this issue but, as she says, it is necessary to have something to say and the skill to convey that message to the viewer. She describes how, through often tedious trial and error, she has achieved surface qualities and colours that make her message clear and without interference. At the same time, she offers a standard of beauty. Tung Ta-Shan, an expert painter and carver of porcelain, explains some of the methods he uses to highlight qualities of light and shade by the use of colour and texture. These skills have been developed over years of experimentation. Steven Goldate describes the continuing research (outlined by Les Blakebrough in Issue 1 of *CeramicsTECHNICAL)* on the use of metallic salts on porcelain. This technique requires careful notation and skill in both application and firing to achieve successful results. Wood firing, so often thought to be an unpredictable, even haphazard affair, requires knowledgeable handling and an understanding of what is happening in the kiln. Several articles in this issue of magazine show that in using the techniques of wood firing, a practice gaining momentum throughout the world, a potter needs to bring skill to every aspect of the art from clay formulation to making and kiln management. For pots to withstand high temperatures for extended lengths of time, any deficiencies in the potter soon become evident.

Freedom to concentrate on aesthetic and expressive qualities is gained through technical ability. Writers in this issue of *CeramicsTECHNICAL* have shown how they achieved their own rewards; they have been prepared to offer this knowledge to others through this magazine.

Maiolica
An Artist's Medium

Alexandra Copeland describes her personal approach to Maiolica, demonstrating the need for both drawing skills and something to say

THERE ARE MANY WHO, till the end of their lives, keep it {a recipe} hidden from their own sons and who, knowing themselves to be on the point of death, call to themselves their eldest and wisest son, and publish to him this secret amongst the other goods they leave behind. Piccolpasso[1].

Maiolica is the painting of coloured oxides on an earthenware glaze which has been made opaque, usually with tin oxide or zircon. Several different suitable glaze recipes can be gleaned from different sources, for example, Alan Caiger-Smith[2] or Daphne Carnegy[3]. The difficulty is in finding a suitable clay body/glaze fit – the early attempts of most would-be maiolica artists invariably show massive crazing. A clay with a high lime content usually provides a

Above: Detail of a vase where I was too successful in avoiding crazing; the glaze has cracked under compression.

Above: An early, possibly 10–11th century, piece of maiolica which I collected in Afghanistan, It has a simple, stylised iron oxide drawing of a leaping tiger. Right: A tile from an Iranian workshop. 1970s. As a break from production work, the artist has drawn a whimsical picture of a companion.

I have always aimed to produce strong colour with simple glazes, based on glazes available to early potters. These fire to 1060°C or less for both traditional and practical reasons.

body with high contraction on cooling, preventing crazing and allowing more flexibility in the choice of glaze.

Glaze recipes and clay bodies are not maiolica – maiolica is brushwork and colour. Each artist will find it necessary to develop a set of individual glaze and colour recipes. An alkaline glaze turns copper green to turquoise and cobalt blue to violet; brilliant glazes on a lead bisillicate frit can be pastel on another glaze. Finding a palette is strictly an empirical process. I currently use a base glaze which turns cobalt blue to a strong violet, and it took more than 30 tests and modifications to the colorant to arrive at the blue I now use. I decided that the traditional Italian cobalt blue has too much of a red shift for our Australian light. I prefer a more Chinese-style cobalt blue. Being sensitive to colour, I have struggled for years to achieve a group of colours that are in harmony with each other.

It is futile for anyone seriously to attempt maiolica unless he or she can draw. Subject matter is important. It is necessary to have something to say. For simple decorative ware, underglaze is a more suitable medium. (The fashionable Mediterranean maiolica tableware is hand painted by trained artisans from a form of stencil. It is difficult and repetitive work, with long hours and low pay.) In the studio, maiolica is an artist's medium.

When a piece of maiolica has been fired it will last for thousands of years, although possibly in shards. Village potters in India take this responsibility seriously – the kiln should not be fired unless the contents are worthy. Fuel should be conserved. Gujarati potters sing a song as they ignite the fuel to fire their pots: *Beware o insects, the fire is coming,*

The kiln is set afire, Beware insects, ants and all living beings[4]

The museum in Deruta has a 17th century plate with a picture of a boy cheekily poking out his tongue. I did my own version on a jug while in Deruta in 1993.

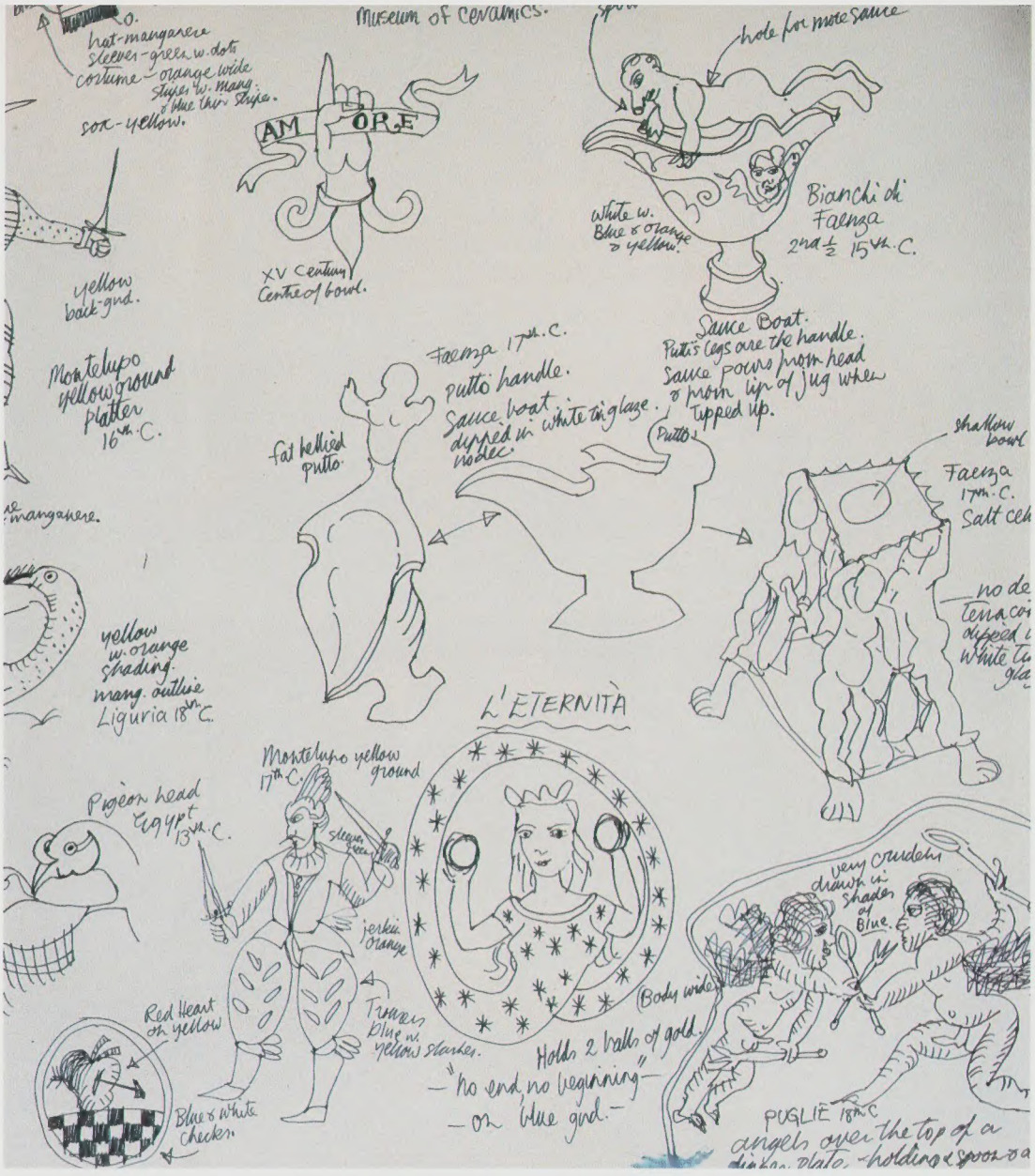
Most text books offer suggestions for applying a temporary outline on the powdery base glaze: soft pencil, Dylon dye, food colouring. The traditional form of stencil is applied with a pounce, a cloth bag filled with fine carbon which is tapped over a pinhole stencil. But it is the free brushwork on early Islamic and medieval pots which should be the inspiration for maiolica painters. In my own work I reject absolutely the use of temporary outlines.

It is impossible to transfer satisfactorily a flat drawing to a curved surface. I love the way the hand can run the brush over a curve. The eye adjusts the line and the hand obeys the eye. Early tin-glaze wares show wonderfully quirky

brushwork. I like to achieve some of this vitality and spirit into my work. If the hand does not obey the eye you can improvise as you go. There is sometimes a sublime moment when the hand holding the brush does obey the eye looking at the object.

I rarely make preparatory sketches – even with large complex compositions. Repeated drawing of the same subject dulls the initial response. The drawing will usually be better the first time. A considerable amount of time is often spent thinking about a design. I pace around looking at talismans dotted around the house – objects that have the quality to put me in the right mood. Tidy the house, read Japanese haiku poems, procrastinate.

From the sketch book, Deruta Museum, 1993


Museum of Ceramics.
hole for more sauce
AM OR E
XV Century Centre of bowl.
Bianchi di Faenza 2na ½ 15va. C.
White w. Blue & orange & yellow.
yellow back-grnd.
Faenza 17va. C.
putto handle.
Sauce boat dipped in white tin glaze.
Sauce Boat.
Putti's legs are the handle.
Sauce pours from head & from lip of jug when tipped up.
fat bellied putto.
Montelupo yellow ground platter 16va. C.
shallow bowl
Faenza 17va. C.
yellow w. orange shading. mang. outline Liguria 18va. C.
L'ETERNITÀ
Montelupo yellow ground 17va. C.
Pigeon head Egypt 13va. C.
sleeves
jerkin orange
Trousers Blue w. yellow stanks.
Red Heart on yellow
Blue & white checks.
very crudely drawn in shades of Blue.
Body wide
Holds 2 balls of gold.
"no end, no beginning"
— on blue grnd.
PUGLIE 18va C
angels over the top of a

From the sketch book, Museum of Ceramic Art, Faenza, 1993

An alkaline glaze (Harry Memmott), 1100°C.

Ferro frit 3124	*61.60*
Ferro frit 4058	*11.33*
Barium carbonate	*3.29*
Calcined kaolin	*4.68*
Kaolin	*14.99*
Silica	*4.11*
Tin oxide	*10.00*

A design forms in my mind. Usually at this stage I am tense and difficult to live with. When the design has formed I start boldly. A surgeon can't have a second chance, so why should I? After years of working like this I now rarely abandon an attempt.

A blue outline comes first. Usually I start at the top of the platter and work my way down to the bottom – also going from left to right as if writing. The design is not copied from a preparatory drawing but from a mental image or from an arrangement of objects set up in the studio. Working from top to bottom makes smudging less likely. Because the tin-glaze surface is powdery, contact with it should be avoided. Large muscles have developed in my right arm as a result of holding my hand aloft for hours on end while painting.

I am almost evangelical in telling children to practise drawing. Drawing is like ballet. You need natural body coordination, but if you train your muscles you will become better. Hand and arm muscles need to be trained in order to have them do what your eye and mind want them to do. Just as a greengrocer can cut off a one kilogram piece of pumpkin by looking at the pumpkin and

knowing how big a kilo slice is – so a practised drawer can look at something and draw it.

Most of my work relies on seasonal subject matter. Morning Glory flowers from the back fence in a lane nearby are arranged in the studio. The flowers are drawn directly on the platter in blue. The drawing stage requires intense concentration and suffers if there are any interruptions. Standing over the platter for four hours or more, I complete the entire outline. Often colour notes in the form of little dots of coloured glaze are put in to jog the memory. Sometimes bits of paper with instructions are placed nearby – buds pink to plum – etc.

The colouring-in stage is done in a little studio full of Indian masks and folk toys, museum postcards and Javanese puppets. A turntable sits on a pile of books on a low kindergarten table. The turntable height can be adjusted by adding or subtracting books. Big platters need to be lower in order for me to reach over them. I sit on a sheepskin covered chair. An ugly AM/FM radio, tape and CD player lurks nearby. Talking books are good company.

It is best to mop the studio regularly, to wear a clean overall daily, and to wear

My version of the Duke of Urbino with his red hat, painted in copper green, fired, then refired in reduction at 700°C. The first reduction firing in Deruta failed, leaving the Duke dressed in green. I tried again in my own studio with success. I have increased respect for the early producers of lustre ware.

Oh! that summer moon. *1989. There is sometimes a sublime moment when the hand holding the brush does obey the eye.*

Two glaze recipes similar to those used by early potters provide a starting point for experimentation.

1.(Alan Caiger-Smith) 1040°C
Ferro frit 4364 (lead bisilicate) 74
Kaolin 10
Whiting 2
Flint 4
Tin oxide 10

2. (Based on Franchet) 980°C
Ferro frit 4364 31.5
Ferro frit 3271 (borax frit) 68.5
Kaolin 10
Tin oxide 10

a mask while working. Splashed glaze becomes breathed-in dust.

Painting in the colours is an extremely time-consuming task. Painting on maiolica is not like painting on paper or canvas. The base glaze is powdery and absorbent. The colours must be constantly ground and stirred. For every two small overlapping brushstrokes, I mix and grind the glaze, and refill the brush. In Italy, the maiolica painters mix and grind their colours on flat tiles. I prefer to mix small quantities of glaze in small plastic containers. The container of glaze is held in the left hand. The turntable can be gently turned around as the colouring progresses. Brushstrokes look best if they follow the curves of the drawing. With backgrounds, the strokes radiate out from the centre to the rim.

The most time-consuming piece I have done took 28 hours to colour (not including the outline drawing.) Luckily it survived in the kiln. I often spend a straight 12 hours in the studio. Because it is not a good idea to eat in the studio I stoke up in the morning and do not eat again until I stagger upstairs with red eyes and in a foul mood due to low blood sugar. Traditionally, my husband, Leigh, brings me a vodka and tonic at 5.30pm.

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1. Cipriano Piccolpasso, *Arte del Vasaio*. 1548
2. Alan Caiger-Smith, *Tin Glaze Pottery*. Faber and Faber, 1973
3. Daphne Carnegy, *Tin-glazed Earthenware*. Craftsman House, 1993
4. Haku Shah, *Votive Terracottas of Gujarat*. Mapin, India, 1988

Alexandra Copeland is a ceramic artist living in Melbourne. An article on her work appears in *Ceramics: Art and Perception*, Vol. 24, 1996. Photography by Andrew Clarke.

Porcelain Painting Created By Wire and Brush

Tung Ta-Shan describes how he paints and carves the porcelain to achieve particular effects

FEELING THE PASSION flowing explains my particular affection towards porcelain painting. After reaching a temperature of more than 1200°C, the porcelain is reborn and glows with colours. Painting on porcelain gives me an extra sense of expectation which is not found in two-dimensional painting. Completing the decoration, before glaze firing, I feel an instant satisfaction. In the meantime, I start to wonder how this piece of porcelain will look after glaze firing. Although my past experience can tell me what colour or shape it will be, I am always anxious to see the result. Decorating on the plain clay to produce a piece of coloured porcelain can be likened to a pupa breaking out of a cocoon and turning into a stunning butterfly fighting for its own destiny. While painting the porcelain, this vision of creation always touches me.

Porcelain painting is different from two-dimensional painting because you are actually painting on a material which can have various shapes so you have to adapt yourself to different painting positions and methods or different ways of holding a brush, as well as working with changing strengths or different emphases. For this reason, I find that lines drawn on the porcelain are more

Tung Ta-Shan in the studio

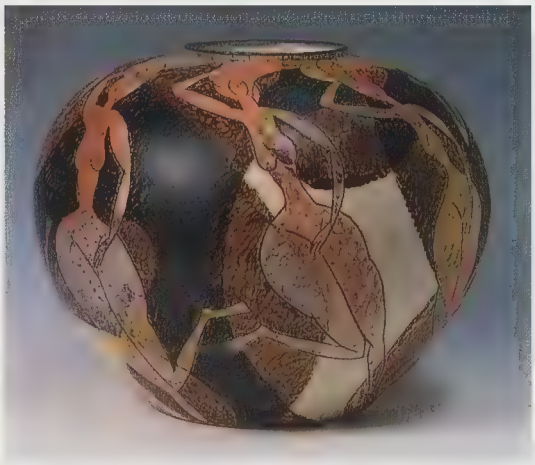
Above left: Rolling the raw pot on rough cloth laid with gravel produces the natural texture of the rock. Then I carve in relief. After the glaze is applied, I scratch with a knife, painting and spraying the object with a brush pen and toothbrush to make the dark portion. The whole piece was coloured with a matt glaze. Above right: Drying the piece until it can be carved to produce cracking lines to resemble mountains and rocks. The effect was made by a rip-saw blade and burin. Painting green pigment on the black stones to resemble the moist effect after rain. Firing completed with a shiny glaze.

natural. The ways of applying glazes on the clay are even more variable. Through numerous experiences and comparisons of the applications and results, I have a much better idea of what colour I should use to achieve the effect I want.

Whenever I am faced with a new piece to decorate, there is always an unknown pressure upon me. I ask myself how to make a piece of good porcelain. It seems the porcelain is telling me that its destiny is completely under my control. Sometimes I design by inspiration and other times I will draw a design on paper before starting to paint. In the past few years, I have accumulated many hundreds of different designs.

Most of the porcelain pots or vases I choose to paint are of an arch-like shape. Therefore, arch lines are the major element to form the whole image including styling, setting, colouring, etc. The effect of decorating with these romantic lines may induce the musical-like rhythm of vision and, besides, a pot can be viewed from all angles to show different and interesting images depending on the position you are viewing from. That is the special fascination of the round porcelain form.

The plain clay feels so cool, so delicate and so subtle which makes the carving much easier. Almost any kind of drawing skills can be applied to the subject – painting, spraying, scratching, sculpting or polishing, etc. Porcelain painting is a new form of drawing for me, full of the fun of experimenting with this creative procedure. I feel that porcelain painting is the accumulation of numerous experiments and untold hours of pleasure.



Although I have had 20 years of experience of drawing and design, I could find nowhere to start decorating when I first painted on the plain bisque. I decided to use the arch-line symbol as my decorating pattern after trying a few pieces. I am particularly fond of using wire to carve the surface because the clay is frail before glaze firing. The clay falls off with the wire and forms saw-tooth-edged lines which are like the ancient characters graven on stone – simple, natural with unique interest.

Without using enough force, the line I carve will not be deep enough and look too weak. If I apply too much strength when carving, the lines will be like the roots of an orchid – fine but solid. Therefore, I have to pay close attention to each line I carve.

After brushing off the bits and pieces left on the carved surface, mixing black paint with water and applying it to the carved lines, I wipe off the extra paint outside of the lines. Then I can start glazing.

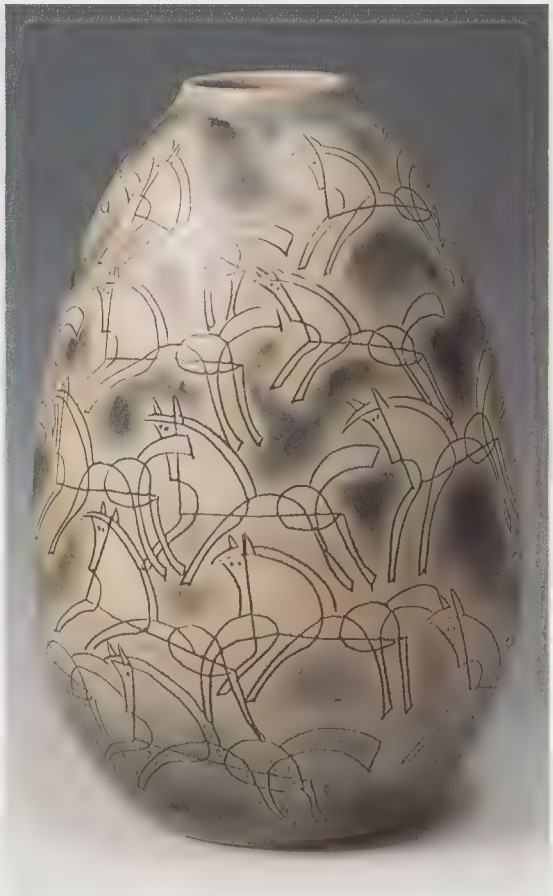
Coloured porcelain is made by firing the work under extremely high temperature after painting and applying the glaze mixture. The colour will become darker or lighter, depending on the temperature. Experience will tell you how to apply glaze on the clay. I draw particular attention to the change of colours and especially like to use rich tones.

While the clay is still soft, I apply foundation colours, then use wire to carve patterns and then cut out the blank portions with a knife. Darker colours are then used to produce various visual effects.

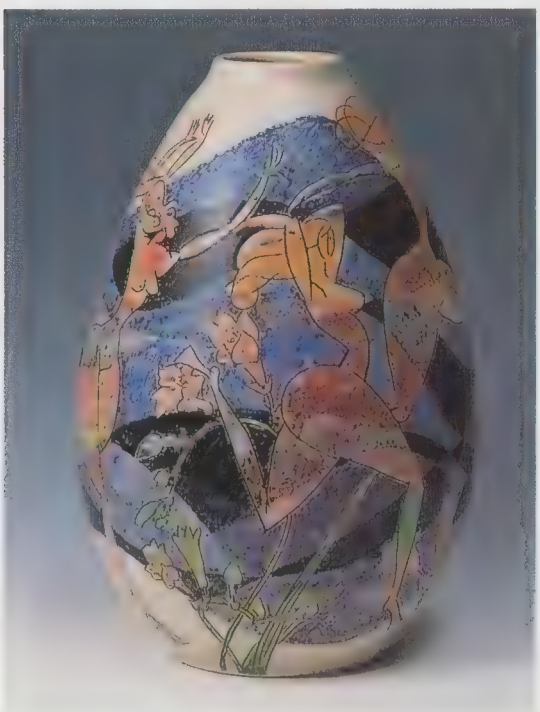
At other times, I will sprinkle pigments on the clay so that the lines already

Above left: The method is similar to the previous one but the emphasis is on the quality of the rock. Deeply carved lines will look heavier after colouring. It is coloured with a matt glaze.
Top: After drawing the ladies, I painted the whole piece with arch lines. Applying a heavy colour as a foundation makes the light subjects stand out.
Above: Forming the pattern of trees by arch lines with bright colours. The over design was made by black brush painting, emphasising the proportions by carving.

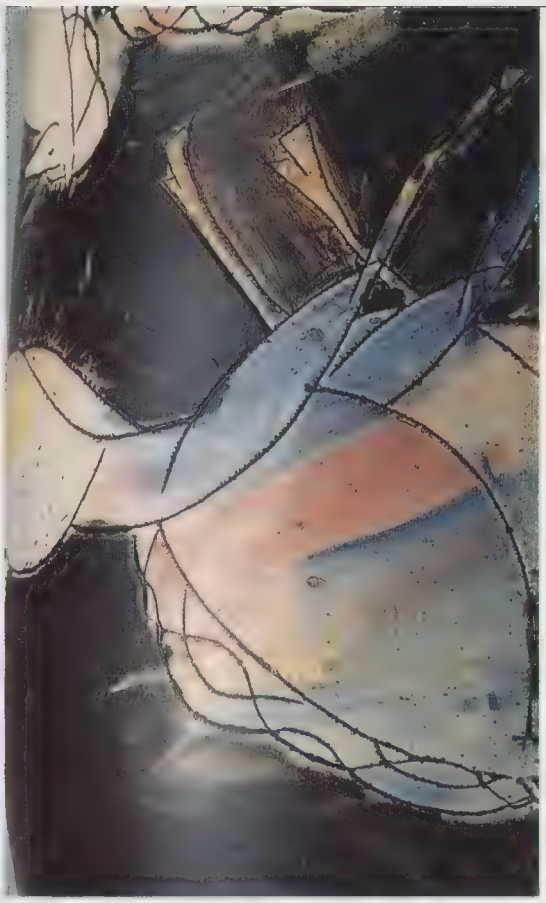
Above: Carved lines of horses and painted background with brush pen. Horse were repainted with squares in graduated colour to make it look rich.
Below: Showing five consecutive motions of the hop, step and jump of the lady. The colour was painted with sufficient water to lighten the movement.



Above: To produce the effect of the galloping horses, I spread the foundation colour with my fingers, then carved the lines of horses before filling with black colour.
Below: Glazed at high temperature to dissolve and mix the glazes produces a natural effect. The carved black lines stop glaze flow. Ideal to show the fish.



Painting colours in combination as foundation before carving the subject. Using a burin (knife) to carve away the foundation colour to make the subject stand out. It is not easy to draw but can achieve good effect.



Above: Using a toothbrush to spray colour dots on the subject to produce a strong effect of movement.
Below: Spraying the object with one layer of colour then carving the subject matter. The foundation colour was rubbed with sandpaper to produce a soft effect.

Left: Spraying the whole object with one layer of colour then carving the subject with burin. Carving base lines makes the subject stand out.

The subject of the lotus was presented by carved lines and applied black pigment colour. The bright water effect of the background provides a good contrast to the beauty of white porcelain.

carved will appear faintly on the surface of the porcelain after firing. Mixing with different colours may show the various colour layers.

By painting with various colours before forming the lines, the effect is that the lotus leaves will be multi-coloured; the horses, female forms, birds and fish, etc. are all as colourful.

Before painting on porcelain, I have to consider the shape of each piece, the contour of the face and its size so that the design can merge with the style of a complete object.

From the abstract symmetry of the composition in pre-history period to the delicate light colour in the Qin Dynasty, China was famous for its coloured painting on porcelain. However, a modern artist emphasises the creation reflecting his own personal style.

Besides the beauty of the porcelain itself, I believe that genuine commitment and a generous spirit are necessary to achieve the good results I am looking for. Combining the ancient art of painting with modern art, I try to establish my own porcelain painting style when using both brushing and carving techniques.

By using my wire like a farmer uses a plough, my brush dipped with pigment is the fertiliser while the love for the work in my mind is the seed planted in the soil.

By blending, carving, painting, styling and using vibrant colours with interest and affection, I can create a world of porcelain painting.

Tung Ta-Shan is an artist from Taiwan, currently living in Sydney.

The Enigma of Watercolours On Porcelain

1. Cobalt sulphate and a light coating of uranyl nitrate and applied acid decoration

Steven Goldate adds to the research on the use of metallic salts on porcelain

2. Iron sulphate with shellac resist technique

THERE IS SOMETHING ENIGMATIC about the 'Watercolours on Porcelain' technique. The elusive colours that may or may not be as expected; the transmutation in the fire – to achieve that most precious, beautiful surface. The parallels with alchemy of the Middle Ages certainly are there: European porcelain was discovered by the German alchemist, Johann Friedrich Boettger, in 1709, after there had been numerous but vain attempts to copy Chinese porcelain between the 15–17th centuries. Then there is the quest for precious metals – gold, silver, rhodium, palladium; the transformation in the high temperature firing; the knowledge of the underlying chemical processes; and the chance discoveries. However, it is not gold that we are trying to discover (although precious metals including gold may be used), but the watercolour effects on porcelain used by relatively few ceramists. This has its reasons: some of the raw materials are expensive, they are toxic and necessitate extreme care, and the results are not always promising. More research needs to be undertaken, despite knowledge already pioneered by others.[1]

As most readers will know, the majority of traditional ceramic colours are in the form of oxides or carbonates that are used in underglazes, on-glazes and as slip and glaze additives. From these oxides and carbonates come the broad palette of decorative effects known for centuries.

In the late 1980s, Professor Arne Åse of Norway investigated the use of water-soluble metal salts, derivatives of the oxides and carbonates, for colour effects and applications in studio ceramics. He chose to test these substances on porcelain. These water-soluble metal salts are chlorides, sulphates and nitrates of some common and not so common metals, gold chloride, nickel sulphate or iron nitrate. In most cases there will be a chloride, nitrate and sulphate version of a given metal available, for example, copper chloride, copper nitrate and copper sulphate. There are also some useful colorants that aren't metallic salts, but nonetheless water-soluble, such as potassium dichromate. Being water-soluble, these chemicals will react by diffusion when applied to a clay surface. Instead of sitting on the

3. Cobalt sulphate, iron sulphate and shellac resist

surface, they stain and penetrate the clay, sometimes migrating through to the other side to give some unexpected results.

While a considerable amount of research has been done with the chlorides and nitrates, I believe the sulphates have been overlooked. The fact that iron sulphate, cobalt sulphate and copper sulphate are readily available[2] and inexpensive, led me to investigate these chemicals. In this article I will also discuss the use of gold chloride, potassium dichromate and, to a degree, uranyl nitrate, as well as the effects of resist materials and the use of phosphoric acid. These materials can sometimes be bought from potters' suppliers, some will need to obtained from a supplier to laboratories. For the purposes of the studio potter, the grade or purity need not be high. Generally these materials are supplied in a powder or crystalline form from which a solution must be made. When dealing with these chemicals it is advisable to wear thick rubber gloves, a mask with filter attachments and also goggles to protect the eyes. Eating or drinking anywhere near these chemicals is out of the question.[3] A few other items will be necessary: some glass jars that will not leak; a chemists' measuring tumbler with measurements from 1 to 50 ml; and an accurate set of scales with 1 gram gradations. All decoration is carried out on bisqued ware and then fired to approximately 1270°C in a reduction atmosphere.

Cobalt sulphate

A useful concentration for cobalt sulphate is 10%. To make this, weigh 10 gm of cobalt sulphate powder and add it to 100 ml of water. I have used distilled water but this isn't really necessary unless your tap water is impure. Carefully add the powder to the water without spilling. Brushes must be washed well in running water and not used for any other purpose. Always ensure there are a few layers of newspaper underneath the work to avoid soiling the working area. If anything is spilt, clean it up immediately and thoroughly. Never reuse cleaning utensils such as sponges.

The solution is now ready to be applied. This can be done with a brush, either freehand or on the wheel. Just how many layers of solution should be

4. An example of copper sulphate application fired down in reduction

brushed on depends on the result you want as well as on the type of brush you are using and on the density of the clay. Spraying is not recommended because it can be hard to judge the thickness of the chemical, even with a timer and a spraying booth. One of the greatest difficulties in applying these chemicals is the fact that they are hard to see once painted on, although one could add ink or food colorants to the liquids.

After applying the cobalt sulphate, I sometimes apply a layer of uranyl nitrate over the sulphate, also with a brush, and in a concentration of 7.5%. The greatest care needs to be taken with this toxic chemical. After a short drying time, phosphoric acid (85% concentration) can be applied to achieve a halo effect.

The effect of the phosphoric acid is to displace the colours and concentrate them on the edge of the brushwork. This will often reveal the white colour of the underlying porcelain. Figs. 1 and 7 illustrate this effect.

IRON SULPHATE

To obtain a deep colour from iron sulphate, one needs a highly concentrated solution. To make this, take 100 ml of water and add 100 gm of iron sulphate. This solution can be applied to bisqued ware, with or without resist decoration. In Fig. 2, I have applied the resist material, shellac, in the form of stripes and brushed over several layers of saturated iron sulphate. The effect of the resist is to preserve the white porcelain body from the colorant. This technique can be used with any of the metal salts. Sometimes there will be a concentration of colour along the edges where liquid has collected. After decorating, it is necessary to remove carefully any residue of the salts from the shellac (with a sponge or moist tissue), because this will stain the surface underneath in the firing. It may be necessary to let the piece dry between applications.

Iron sulphate can also be combined with other colorants, for example, cobalt sulphate. Fig. 3 shows a vessel decorated with shellac resist, cobalt sulphate and then a further layer of iron sulphate applied on top.

5. One of a set of nine tiles. An example of calligraphy on porcelain. From left to right: Uranyl nitrate, cobalt chloride, gold chloride

COPPER SULPHATE

In my research with copper sulphate I have been able to achieve deep reds akin, in depth of colour, to traditional copper red glazes. To achieve this type of colour (see Fig. 4) it is necessary to use a strong solution of copper sulphate. Dissolve 25–30 gm of copper sulphate in 100 ml of water. This solution is applied in several layers on a bisqued piece. After an hour or two, as the piece dries, blue crystals should be forming on the surface. They may grow literally in front of your eyes. If there seems too little colour on the piece, more copper sulphate may be added. These blue crystals give an indication of what the piece will look like after a reduction firing, only changed to a deep red colour.

The firing cycle is important. If the piece is oxidised, an insipid yellow colour will result and the chemical also tends to attack the clay surface. Work decorated with copper sulphate needs to be fired in reduction, the same as with copper red glazes. The reduction should be medium to heavy and, most importantly, the kiln should be fired down in reduction for the first few hundred degrees, that is, from 1300°C (or whatever the maturing temperature of your porcelain) to about 1000°C, to avoid reoxidation of the copper. When fired in this manner, a deep red should result with possible grey areas where the solution was applied more thinly; also the surface will stay smooth. In some cases there may even be areas with a silver appearance (see Fig. 6.)

6. Detail of copper sulphate revealing salt crystal structure and silver lustre effect

GOLD CHLORIDE

Gold chloride can be purchased from laboratory suppliers although I use gold lustre (which contains gold chloride) instead and is readily available from potters' suppliers. A good colour response may be obtained from it, although this method isn't exact regarding quantities. I thin the lustre with conventional lustre thinner.[4] The colour can be applied with a brush or nib and is clearly visible in contrast to the near colourless water solutions. Gold chloride is a reliable colorant in oxidation and reduction and will result in light to deep pinks, depending on the concentration. See Fig. 5 for an example of gold chloride application.

Potassium dichromate

Potassium dichromate chemical is a bright orange crystal in the raw state and is toxic. Its saturation point is about 12%, meaning that any further additions won't dissolve in solution. 12 gm are added to 100 ml of water. Because a heavy application of this chemical is necessary to obtain a good colour response, the 12% solution needs to be applied in several layers. As with copper sulphate, crystals – in this case, orange – should grow on the surface during drying. If the concentration of colour does not appear to be enough, more solution can be applied. Potassium dichromate will fire to an olive green in reduction. I find the colour can be improved by a small addition of cobalt sulphate which can be applied separately or added to the solution itself. Potassium dichromate also lends itself well to the use of resist materials.

Uranyl nitrate

Uranyl nitrate is the most toxic and one of the most expensive of the metal salts. Extreme care needs to be taken when handling this chemical. One remarkable aspect of this substance is its capacity to form an edge of concentrated colour in combination with phosphoric acid; this displaces the colour and reveals the whiteness underneath as can be seen in Fig. 7.

Glazing

Usually I do not glaze my work. As the porcelain is vitrified, it will hold liquids without problem and the smoothly sanded surface of the unglazed porcelain offers a tactile experience unlike any glazed piece. Nonetheless, in the case of functional ware that is to be used on a daily basis, it is necessary to glaze the work. In some cases I may glaze only the inside, in other cases the whole piece. Because any application of moisture on the bisqued ware will affect the applied metal salts, a different approach is needed for glazing.

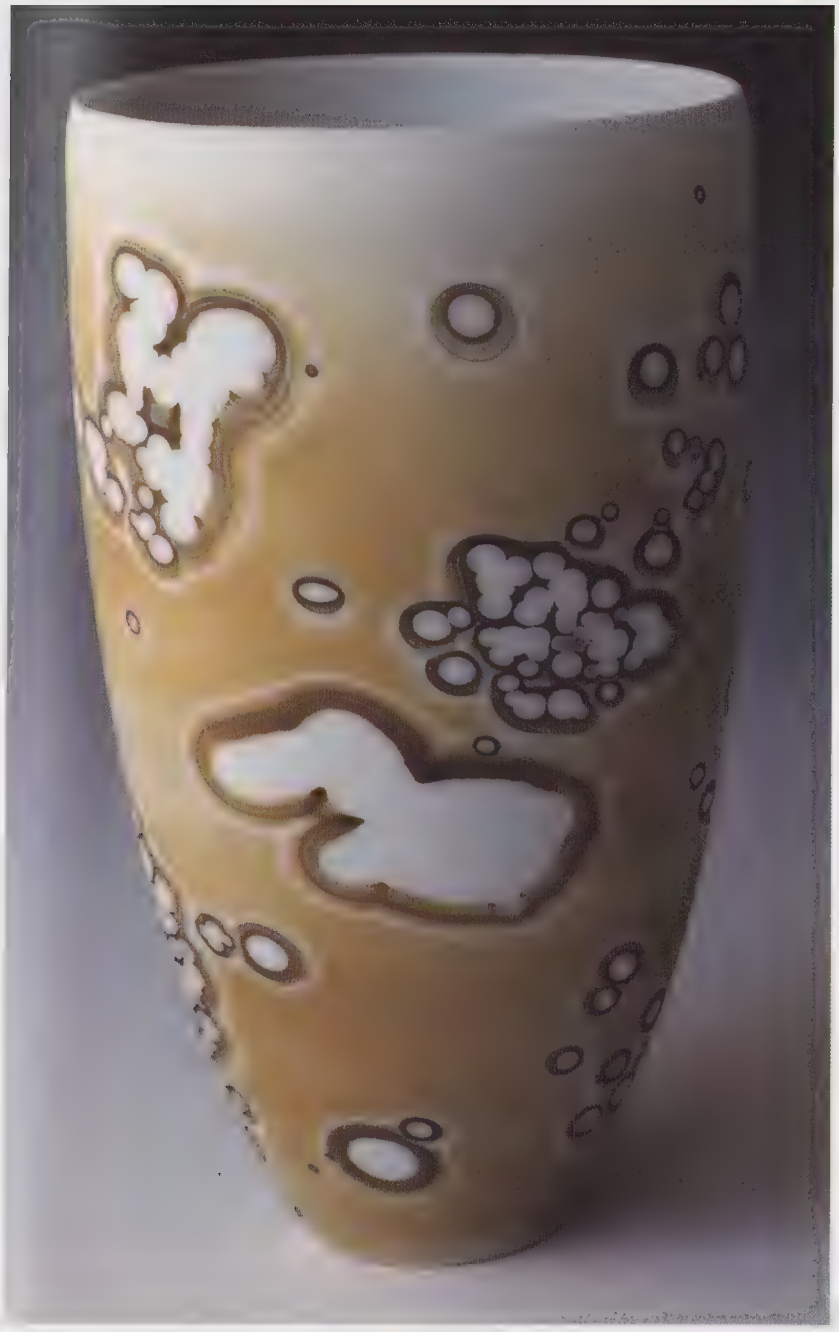
One solution is to fire the decorated work to the maturing temperature and then glaze at a lower temperature in a subsequent firing. This requires the work to be carefully heated and the glaze meticulously sprayed on with a spray gun. It will be essential to experiment to find a glaze that will fit the porcelain body and the application will also take practice. I use a wide-range high-gloss glaze and fire to 1100°C. But this technique will work with only some of the metal salts, for example, cobalt chloride and uranyl nitrate, without changing their appearance. Glazing in this manner will not work well with copper sulphate, iron sulphate or potassium dichromate without blurring the crystalline structure of the surface. If the glaze firing is oxidised, the copper will tint the glaze green.

Calligraphy

Because the chemicals dissolved in water are similar to ink in consistency, it is possible to use them not only with brushes, but also in conjunction with nibs and writing pens. Some of the metal salts will give reliable results used in this way. Notably those colorants that need only one application can be used for writing on clay. The best of these are gold chloride, cobalt chloride and uranyl nitrate, (see Fig. 5.) To stop the colours from migrating, add gum arabicum to the water solutions; this thickens the liquid slightly and stops the colours from blurring. Care must be taken not to smudge the already decorated areas. These problems aside, writing adds another dimension to the possibilities of the technique.

Conclusion

The technique of using water-soluble metal salts is relatively new and offers plenty of scope for experimentation. While iron will not be magically turned into gold, the technique can yield some inspiring as well as disappointing results. Colours from metal salts can be unpredictable because there are so many variables that will influence the outcome, for example, kiln atmosphere, amount of colour, degree of vitrification, etc, but this same aspect of unpredictability makes it an exciting and rewarding technique to use.



7. Phosphoric acid over uranyl nitrate gives a dramatic effect

REFERENCES:

1. The 'Watercolours on Porcelain' technique was developed in the late 1980s by the Norwegian Professor of Ceramics, Arne Åse; further research has been undertaken in Tasmania by Les Blakebrough and Ben Richardson (see *Ceramics Technical* No.1).
2. Cobalt sulphate and copper sulphate are available from potters' suppliers; iron sulphate can be found in nurseries as fertiliser but is impure and needs to be dissolved and decanted after settling. Most laboratory suppliers will have pure iron sulphate.
3. Do not use gloves from the supermarket; they are not water tight and the chemicals will seep through and eventually enter the body through the skin.
4. The use of gold chloride this way, while not altogether using a water-soluble form of the metal salts, does, however, work well.

Steven Goldate is a ceramic artist living in Melbourne. In addition to his work with clay, he runs a computer network for ceramists called *Claynet*. His article on using computers for ceramic art appeared in *CeramicsTECHNICAL*, No. 1.

Right: ***Vase.*** *32 cm/h. Multi-fired layers of thin dry slip over rough ash from a previous firing*

Stacking the Wood Kiln for Flashed Colour and Surface Marking

Chester Nealie believes that maximum colour can be achieved in minimal spaces in the wood kiln. He outlines his ideas for optimum effects using a variety of clays

Left: ***Vase.*** *28 cm/h. Multifired. White clay body, Ching-pai celadon glaze.*
Top: ***Pot.*** *10 cm/h. Applied ball clay slip. Multifired. Always placed the same way in the kiln.*
Above: An example of bundle stacking

BUNDLE STACKING POTS IN THE WOOD FIRING KILN is the best way, I believe, to achieve the subtle flashings that occur where the flame bounces between pots, walls and wadding materials. In this article I specifically refer to low arch tunnel kilns up to five metres in length which have a gentle slope leading up to a long horizontal flue and a short chimney.

In loading a tunnel kiln, my foremost thought is to obtain the best possible quality of wood firing for each pot. I look to place the work in the kiln so that all making marks are visible. I want unpredictable effects, directed qualities and that same freedom I try to impart to the clay in making, left on the pots for all time. Ultimately, it is the story of the making and firing that must stand out.

The second thing in setting these kilns is to ensure that they reach temperature. The aesthetic goal must be achieved through the temperature of the kiln and the placement of the pots so that the wood ash can be effective. The pack is directed by the shape of the kiln, the kind of stacking (on shelves or free packed) and where the side stoking will occur. All these aspects must tie together in a way that allows the kiln to reach temperature. It is not enough to fashion a wonderful stack: if you can't get the kiln hot enough, all the effort is

Vase. *31 cm/h. White clay body, fired at front of fire-box*

My usual slips consist of ball clay, kaolin and nepheline syenite in equal parts. Iron oxide additions are not subtle enough for me and give heavy browns rather than orange colours so I would rather use an iron bearing ball clay in the recipe.

wasted. Moving the flame and burning the wood so that the flame heats the pots is a physical matter and as important as the placement of pots.

Reaching temperature is not enough, however. Most people can do it: what to do when you are there and what you do on the way is as important. Indefinable qualities occur to the clay under changes in oxidation and reduction and the stack of pots directly affects these qualities. You can see an oxidised effect from the early Japanese Oribe kilns. Later, potters discovered that putting a brick divider in the middle of the kiln not only supported the arch but also split the vortex of flame in the firebox, enabling them to achieve a better reduction process. This tumbling of flame, bouncing off various pots and breaking up the pattern is what we have to consider as well. We are not only playing with temperature, we're also playing with the conditions of the flame.

The shape of the kiln will affect the way it can be set. If you are stacking a tall or high kiln, it is difficult to bundle stack pots to the top and have the bottom ones support such a weight above them. My preference is to have a low arched kiln and do away with shelving as much as possible.

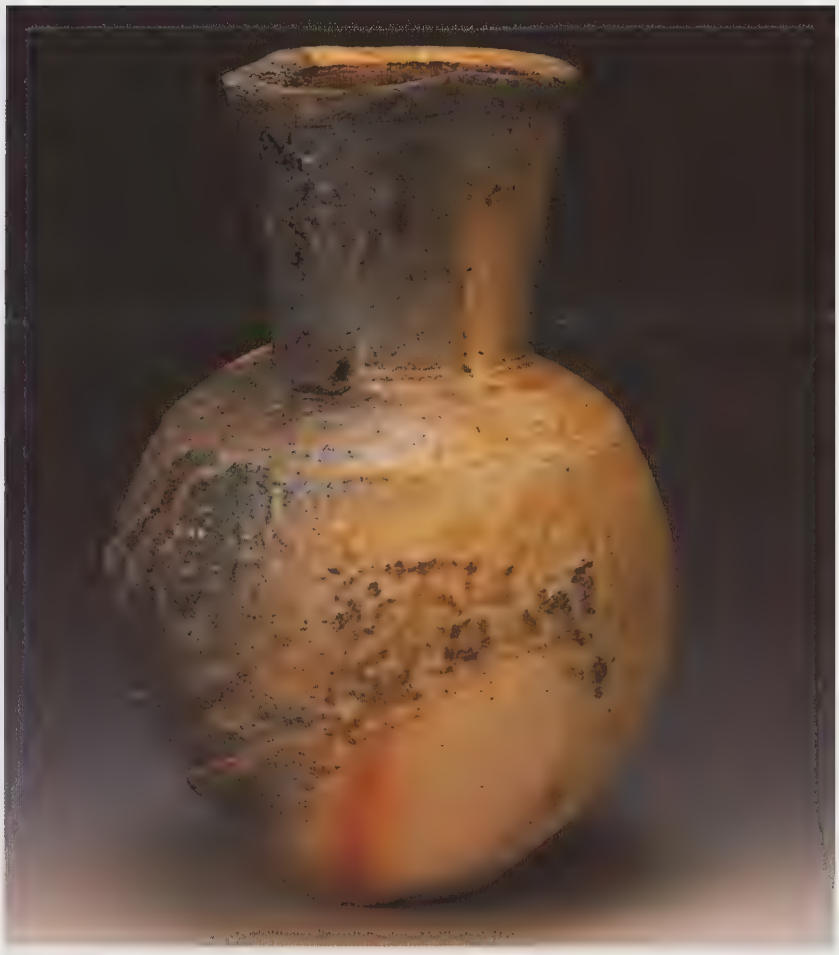
It is critical how the pots are stacked to the roof leaving only enough gaps for the flame to pass. Coupled with this is the need to think beforehand about what shapes will work within each other and which ones will pack together.

Vase. *15 cm/h. Ball clay slip over white body*

Spherical forms will easily pack to the top, but it is better to intersperse these with cylindrical shapes to stabilise the stack. In tunnel kilns there are spaces that have just the fly ash going through and there are spaces where the ash directly settles on the pots, especially from the side stoking ports. Pots can be made specifically for these areas. Consider their shapes – you can't have protrusions where they're likely to be knocked or broken by side stoke wood landing on them. Handles and lugs have to be tucked into the edges of necks and kept out of the way of descending wood.

The strength of the clay body that you are using and the pot shape need to be considered. The pots have to be made with more weight to them if they are going to support a metre of other pots balanced on top. Rims must be stronger and cylinders can't be too wide or they will squash and end up as flattened forms. If pots are going to be lying on each other, the marks of placement are going to be part of their decorative elements. Wads between them have to be carefully considered. Kaolin and alumina wads produce pots that separate easily, but the character of the wad marks – reminiscent of white bird droppings – has a synthetic quality. I feel it is too severe so I look for a much softer blush of colour. When you mix a coarse fireclay with coarse sand (so much so you can barely hold the wad together) you will find the wads just dust off after

I like to use a wad mix made from a fireclay that is refractory and will break down easily. Mixing this with fine or coarse sand or sawdust will have different effects so you can play all sorts of games. For example, Hallams fireclay has a significant amount of iron in it but is highly refractory.



Vase. 28 cm/h. Terracotta body. An iron nail from the wood has melted on the side of the pot

To me the scars left by the wads or shells are important. The quality of the scar is part of the life of that pot and a whole aesthetic develops around what kind of scar remains.

firing. The coarse sand contacts the surface like a bunch of pin pricks and gives the flame a chance to go between the wad and the clay body, producing a dappled colour on the pot.

There are many other mediums you can use for separating pots. I remember from my days at the Auckland Museum being greatly enthused by some superb Korean bowls with delicately warped rims. It wasn't until I picked them up and looked underneath that I found large scars from lumps of silica pebbles. Three pebbles had been placed under the foot ring, sitting straight on the glaze. There was no wiping back of glaze from the foot and these scars left a natural ruggedness to otherwise delicate celadon bowls. The warping that occurred because the pebbles weren't the same size, lent a freedom to the curve that felt like a gift from the gentle action of gravity during firing.

We have seen the use of straw, either soaked in brine or not, or various leaves or grasses or shells placed underneath leaving their marks. I like this use of materials from the immediate environment to create a permanent record on the sides of pots. In the future, these grass patterns could be recognised although the grass itself may become extinct. After all, the pots are going to last a million years.

The placement of the wadding becomes an aesthetic consideration. I like to apply pats of wadding in large, free-form daubs. Used fairly wet, it adheres better on the raw pots. Although it appears nonchalant, these daubs are considered for both placement and size in addition to the functional aspect of standing one pot on another. Too many small daubs give a spotted look. Wadding, when removed, gives an insight or window back into the clay body and/or glaze layer. Shells are my favourite separators for pots. I prefer shells with texture. The shape of the shell is positioned to give maximum surface

Vase. *32 cm/h.*
White felspathic body

contact with clay and the pot is set on wadding with the shell in contact with the pot. The shell becomes calcined during firing, leaving a reversed fossil-type replica; otherwise it is unaffected. After the firing, the calcium oxide of the calcined shell recombines with the air moisture to form a powder. Reluctant shell wads can be loosened by soaking the pot in water, enabling the shells to swell and separate easily from the clay of glaze surface. Residual salt from sea shells tends to leave an orange halo around the perimeter of the shell. This is particularly effective on white and flashing bodies and seems to happen under both reducing and oxidising conditions. An extreme case is to set the pots buried in shells. Any shell particles remaining and subsequently refired, combine with the ash and flux to form significant glaze runs, occasionally corroding the surface of the ware.

I find placing the pots evenly like rows of soldiers gives a boring flame effect. I like to zigzag the pots across the kiln with some in front and others staggered back. I place a large pot in the middle so the flame hits that and spills to the ones behind. I'm playing a rebound game with the flame. The spaces are as important as the actual pots so, as I load, I always consider what the flame is going to do and where I will leave room for it to go. It is easy to pack the bottom of the kiln so tightly that the flame can't get through. It is harder to leave room for the flame to pass through to have an effect on the pots behind.

I try to make a variation of pot forms so the stack is staggered through the kiln. That way the flame bounces backwards and forwards off the walls, off the sides, in between and around the pots. I'll also stack the pots against the wall of the kiln. Without the restriction of shelves, I can use the entire space for my construction. I'm making a sculpture with a purpose – a huge installation in itself.

But the pots aren't always finished after their first firing – they could be fired again and again. A shiny ash surface may be covered with a dry slip or a dry ash surface covered with a glaze of shino and again refired.
The surface subtleties continue with each firing.
Each time new surfaces appear that may be outside your previous experience and may take time to understand.
When is more too much?
This is left to you to work out.

One of the joys I find in stacking and firing tunnel kilns is that there is a reasonable variation of temperature throughout. Consequently, I make pots that will benefit from the different temperatures. Terracotta clay bodies, applied slips, all sorts of coatings, high temperature clays, highly refractory clays are all placed in suitable positions to give flashing. For instance, terracotta which can take temperatures of 1200–1250°C can also give just as magnificent colours in the cooler areas as the high temperature clays elsewhere. I'm not wanting a porous body but a fluxed clay for that soft wet look of the melted ash.

Coarse white felspar clays can be placed throughout the kiln. At the front and sides of the firebox, such pots can achieve a purple coloured ash glaze, and yellow to orange flashes from alternated oxidisation and carbon inclusion. These strange purple blues occur in slightly lower temperature areas where pots are partially covered by ash and where there is a certain amount of free oxygen. The tunnel kiln tends to oxidise around the sides of the firebox and behind horizontal side-stoke holes. I stack pots in these places knowing the probability of these effects.

Clay bodies:
The clay bodies that I use range from terracotta to fine white stonewares and porcelains. All have their specific location in the kiln and lend themselves to a variety of slip and glaze coatings.

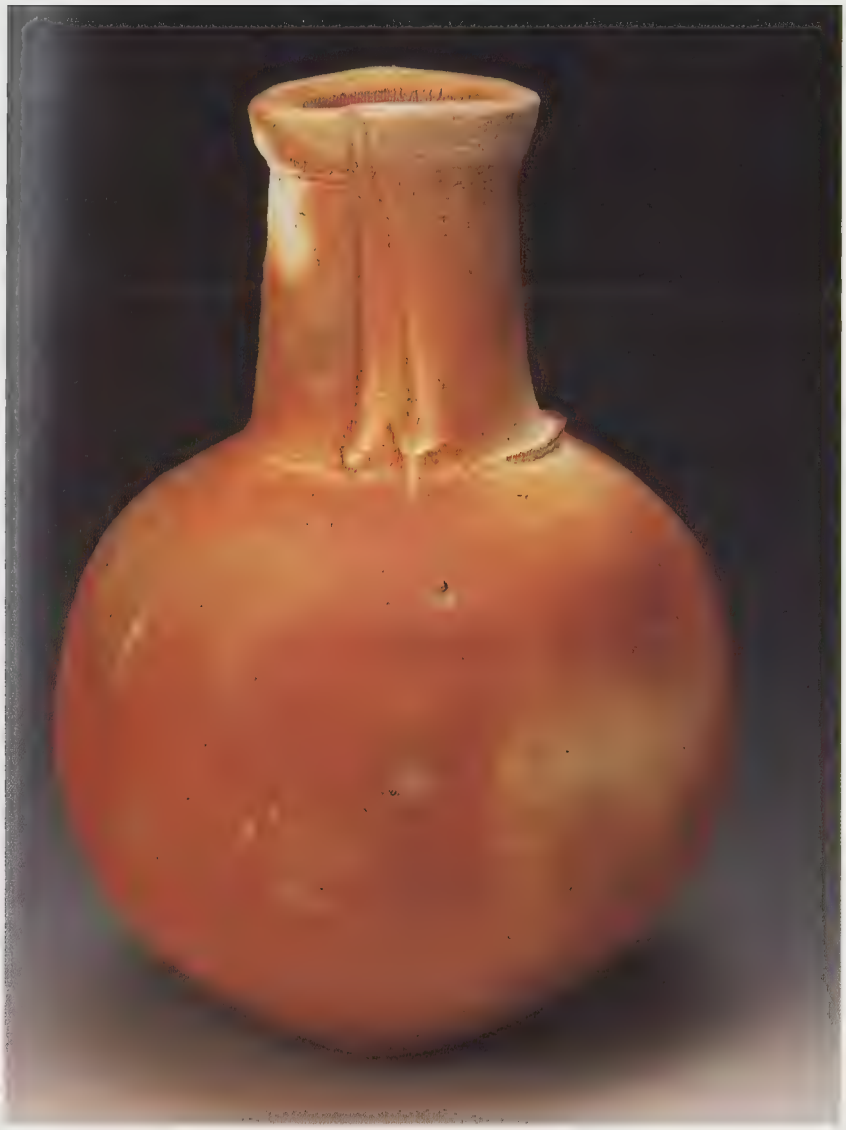
Finer white porcelanous bodies placed further back in the kiln are specifically used for orange flame effects especially in minimal spaces around the wads. They respond well to the fine ash deposits that have been carried through the kiln with the flames. A lizard-skin effect is often found in these areas. Bowls and platters are difficult to place without sitting them on shelves. However, they can be accommodated, especially bowls, if you remember that the flame is always wanting to move upwards. If they are stacked upside down they can give some beautiful comet-like effects as the flame slides in between the wads in its struggle to go up through the pots.

In the main part of the kiln, I am looking for strong reduction from 800°C onward because from that temperature a reaction has started between the iron and the fluxes in the materials. The amount and quality of reduction is not necessarily related to the black carbon coming from the flue. As the kiln is built directly on the ground, the hydrogen from the ground water will act as a reducing agent from 1000°C. Carbon monoxide from the fuel combustion, however, is the main reducing agent. The reduction is kept on a tight edge continuously, balancing the fuel with the amount of oxygen coming in. The speed and colour of the flame is more important than masses of black smoke. It is what is happening inside the kiln that is important. The natural wood firing processes of regular stoking gives variable oxidation/reduction cycles.

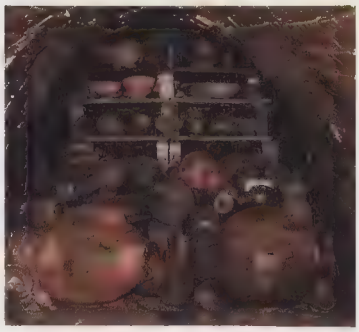
Glazes:
A favourite glaze for anagama-style wood firings is a felspathic one using a high proportion of soda felspar 75% with the clay body of the pot 25%. Other glazes I use are modifications of traditional celadons and tenmoku.

After 1300°C has been reached, (and because the pots are raw, this takes 24 hours), the kiln is kept at this temperature for 70 to 80 hours. During the firing I use side-stoking to build up a heavy load of unmelted ash. I then bring the kiln temperature up again to melt this ash down. This process is repeated over several days, building layers of melted ash on the pots. I sometimes use different woods to vary the colours in these layers. This cycle should finish with a hot melt throughout before the final stage. The kiln temperature should be well in excess of 1300°C at the front, while the back, where the felspathic glazes and dense iron bodies are placed, the temperature should have reached 1260/1280°C.

Following this, the final reduced cooling begins. I stoke heavily over the next four hours until a large bed of embers shows as high as possible in all the stoke holes. At the end of this period, I completely fill the front of the kiln with large logs interlaced with thinner wood. This heavy carbon reduction gives a mattness to pot surfaces. I leave the firebox lightly sealed so that the embers will continue burning for at least 24 hours in a slow lazy atmosphere in order to leave the flame patterns on the pots.



Vase. *35 cm/h. Porcelain slip. This pot was buried in shells during the firing*



When the pot comes out of the kiln there is yet another process to consider. How much ash surface to rub off and how much to leave? After firing, most of the wadding and ash is removed by rubbing with a hand stone or wire brush, or gently chipping with a cold chisel rather than grinding with a tool. I use a coarse to medium-hard whet stone with water to rub down the pots or I can sandblast or chip off the wads to leave those wonderful scars. I think of them as birthmarks, because to me they tell the story of the pot's creation and are an important part of the aesthetic of the whole. The essence is to leave the naturalness of the process so that the story of making and firing is revealed without obvious contrivance. Stacking these kilns takes time and I find it the hardest of all the processes. Loading a kiln is more than placing pieces on shelves – it is to do with using the palette of colour from the flame and ash to paint the pots, not unlike brushing paint on canvas.

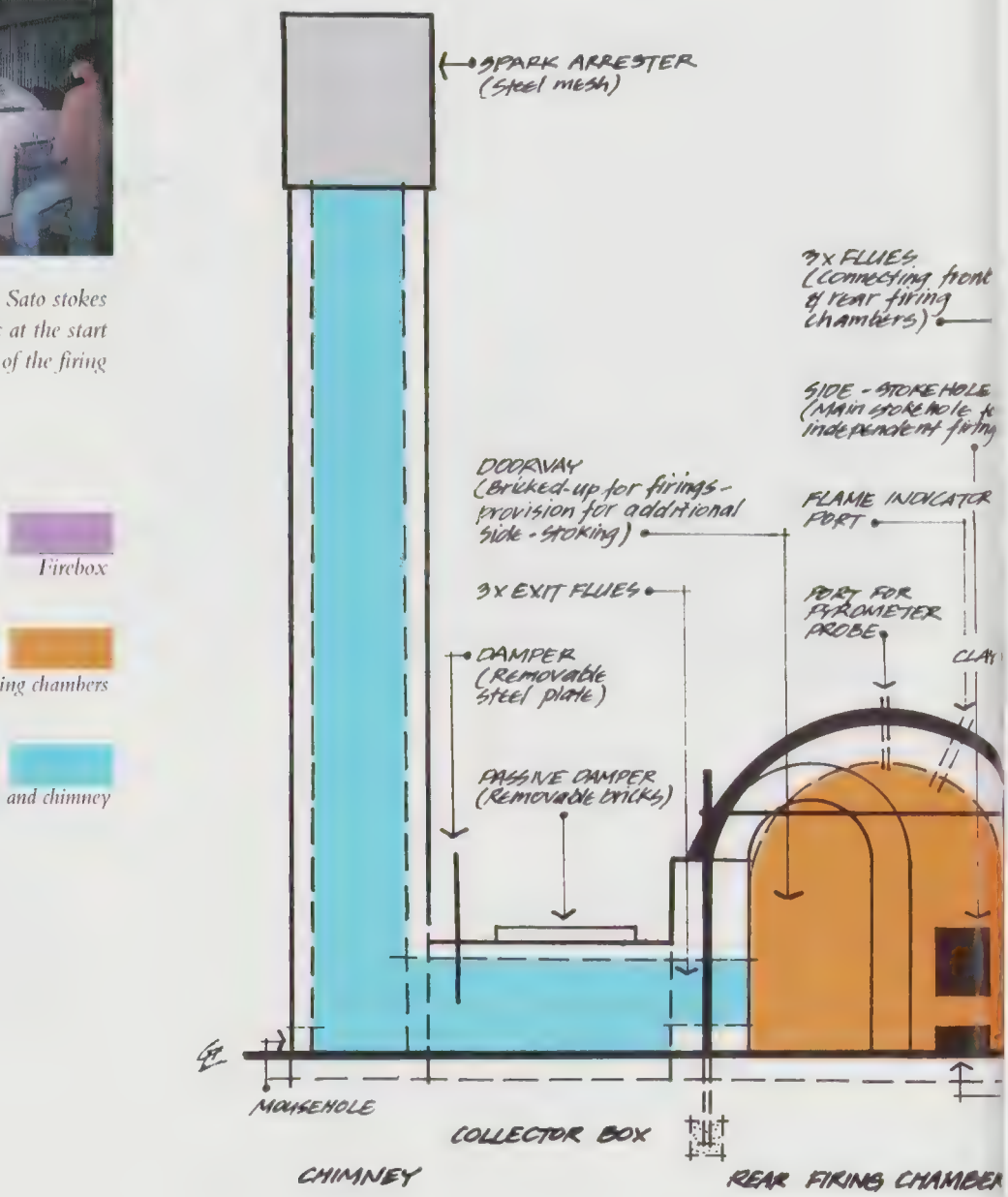
When you think about it, all the problems are just part of the learning curve. The hours on one's knees in a cramped position (the hair shirt of the anagama potter) are worth the effects when you find them. To place a simple little pot in the kiln so that the flame and ash leave their magic mark is worth all the agony of the hours of loading.

Chester Nealie is a wood firing potter living in Gulgong, NSW.

A Wood Kiln and a Cultural Exchange

Dick Aitken describes the building, packing and firing of Japanese potter, Shimpo Kano's wood fired kiln in Australia in 1995

Above: Miki Sato stokes the firebox at the start of the firing



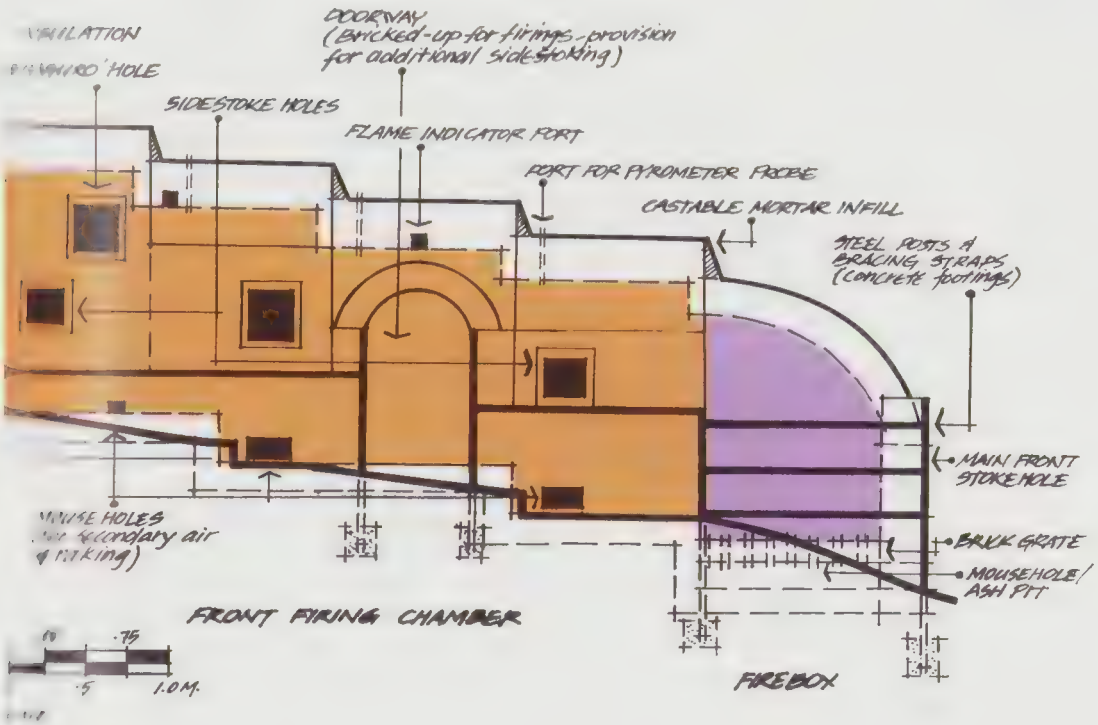
ONE OF THE PARTICIPANTS at *Fire-up Gulgong*[1], a gathering of 300 wood firing potters from around the world and held in Australia in May, 1993, was a Japanese potter from Minokamo City in Gifu Prefecture, adjacent to the heartland of a great Japanese ceramics tradition[2]. His name is Shimpo Kano. Now in his mid-fifties, Kano has been a professional wood firing artist-potter in Japan for more than 20 years, making mostly ware for the traditions of the tea-ceremony, ikebana and celebratory feasting.

Australia was not new to Kano. He had, since the late 1980s, been closely associated with sister city student exchange programs involving Dubbo, in central west New South Wales, and his home town in Japan. In 1991, Kano had purchased a house built on 10 hectares of picturesque rural land on the outskirts of Dubbo, ostensibly to accommodate his children and friends regularly visiting the city for English language studies.

Prior to *Fire-up*, Kano had not envisaged working as a potter in Australia despite his earlier hopes of doing so. The apparent high cost, his lack of local know-how and the complexities of obtaining local government approvals, sourcing suitable materials for kiln building, fuel and the other components necessary for establishing a fully functioning pottery in a new and, to Kano's mind, remote and foreign environment, appeared to be beyond his capacity, particularly in terms of funding such a major endeavour.

Fire-up, however, managed to change all that. There he met many dedicated wood firing potters including the enthusiastic Western Potters Group, and was exposed to an array of kilns made from local materials and fired with inexpensive quality sawmill offcuts and other remnant timber also obtained locally. He discovered the clays and minerals of the region and met the suppliers of these materials. Significantly he learnt that, by Japanese standards, these necessities were relatively inexpensive and affordable. Kano was also offered

Shimpo Kano checks the temperature in the kiln by eye



help to weave his way through the bureaucratic processes needed to obtain building approvals and other permits to set up a pottery and build kilns.

A year later Kano had built a substantial pottery on his Dubbo property and, with the help of a Japanese kiln builder, designed and constructed a large wood firing kiln of unusual and unique design.

Although the first firing of the kiln, which took place in August, 1994, was, by and large, promising with some fine pots – especially those with shino and ash glazes – emerging from the three-day firing, some problems were encountered with the kiln's original design and construction. This led to its being extensively modified in February, 1995, and fired successfully later in the year.

Modifying the Kiln

The modified kiln closely follows the initial two chamber design. Essentially the changes were concerned with strengthening the kiln's walls, the addition of steel reinforcement and refinements to arches, doorways and stokeholes. The two-week project was carried out by Kano himself, one of his Japanese students and a small team of Australian potters experienced in kiln building and wood firing.

Shimpo Kano.
Water Jar
for Tea Ceremony.
Shino glaze

Overall, the kiln is approximately 10 m long, 1.5 m wide across the firing chambers, up to 1.5 m high and two to three bricks thick. From the firebox, with its single front stokehole, the kiln slopes upward at 15° to the exit flue and collector box, which includes a passive damper as well as a movable steel damper plate to control draw. The chimney is 5 m high topped with a wire mesh spark arrester. The floor is two bricks thick throughout, laid on a compacted blue metal base. The total capacity of the kiln is approximately 11.5 cubic metres including firebox and firing chambers.

The kiln is built entirely of standard white house bricks supplied by the nearby Mudgee Brickworks. This brickworks is one of the oldest in NSW and survives largely because of the vast deposits of suitable clay found in the region. This clay is of high quality and easily extracted. The resultant bricks are thus inexpensive, of even size and capable of withstanding high temperatures. They are the preferred material for kiln building by many local potters and used for a variety of kiln types.

Kano's kiln comprises two distinct firing chambers. The first, and main chamber, extends from the front arched firebox through a series of interlinked, stepped and arched sections. An open channel runs the length of the brick kiln floor in order to facilitate flame path and draw. The kiln walls are two bricks thick, topped with two brick (220 mm) thick catenary arches. Midway along the chamber, on the left hand side, is an arched access doorway while three side stokeholes have been cut into the arches on each side, as well as a single *setoguro* hole from which individual teabowls may be drawn from the kiln at high temperatures and plunged immediately into cold water. This is a traditional Japanese procedure, a kind of high temperature raku technique, of which Kano is particularly fond. He is now exploring using Australian clay bodies, glazes and fuel woods. Various small mouse holes are located strategically around the kiln at ground level.

The kiln's 2.6 cubic metre capacity rear chamber is separated from the larger front section by an open brick framework which can be completely brick-sealed if the chamber is being used independently. The space between the side stokeholes on either side may then act as the kiln's firebox. Provision for additional localised side-stoking and/or salting has also been incorporated in the design. A single arched doorway permits easy access for packing

Kiln under construction

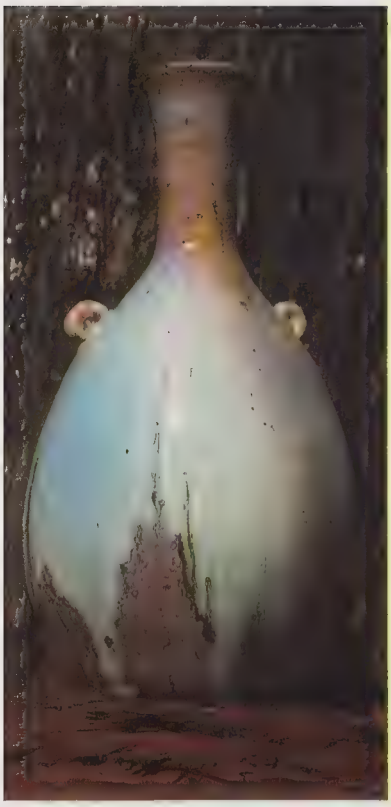
and unloading. The roof, again two bricks thick, takes the form of a roman arch, but at right angles to the direction of the kiln. Originally designed to flow with the kiln, this arch was reversed during the modifications for added strength and stability, to improve heat and flame circulation and to provide greater capacity. Whether the rear chamber is being fired as one with the entire kiln or independently, temperatures may be controlled to allow for bisque and earthenware, salt-glaze or other specialised firings, thus adding a degree of versatility to the kiln.

An innovation, introduced by the Australian potters, that has so far proved its worth was the incorporation of high temperature refractory castable mortar as a strengthening agent at vulnerable spots throughout the structure. It was used as a substitute for the key bricks along the spine of the kiln and for reinforcing arch steppings, doorways and stokeholes. Used in this way, castable has not only proved cheaper than standard bricks but was quicker and much easier to install.

Pyrometer probe and other small ports were fashioned with cardboard templates, thus obviating the need for intricate brickwork. Castable's ongoing structural strength at high temperature has, however, shown to be its foremost attribute in this kiln. The entire kiln is reinforced with a series of heavy duty steel posts concreted into the ground. These uprights support an array of heavy gauge steel angle iron straps which wrap around the walls. Bolted steel rods enframe doorways and the main front stokehole. To finish the kiln, the rear arch was covered with 100mm thickness of a straw/clay mix while the other walls were plastered with a clay/sand slurry. All inner surfaces were cleaned and coated with a kaolin/alumina mix in the case of the first chamber, while 'Super 3000' refractory mortar was used to coat the rear chamber in order to counteract the corrosive effects of salt.

Packing and Firing

Towards the end of August, 1995, potters, students and willing helpers gathered for the packing and first firing of Kano's newly modified kiln. As well as Kano and his Japanese assistant and student, Miki Sato, several professional potters and students from Australia contributed pieces for the kiln. Nearly all the ware had been designed generally for wood firing and most, specifically, for this kiln and this firing.



Shimpo Kano.
Bottle form.
Pear ash glaze

The packing was carefully planned and carried out thoughtfully and quietly over several days. Large rugged greenware: bottle forms, jars, ikebana vases, platters, teabowls and other compatible pots; some pieces unglazed, the remainder ash-glazed or with powdered wood-ash applied to outer surfaces were carefully positioned just beyond the firebox. Some were set on shelves supported by sturdy half brick props, others tumble-stacked in front of and between the shelves. Wadded shells were used extensively to separate many pots. So the packing proceeded with allowances being made for anticipated flame paths, hot and cool spots and other possible idiosyncrasies of the kiln's behaviour during the firing.

Shino ware, with the glaze applied only to bisqued pieces, was packed high at the rear of the first chamber and in the second. Most of these pots were saggared as were other pieces with Japanese type glazes: *nezumi shino, kiseto,* etc, where the effects of flame-flashing and fly-ash were to be avoided. Finally, *setoguro* teabowls were carefully positioned adjacent to the hole from which they would be withdrawn during the firing. In all, some 600 pots were eventually packed for the firing.

The fuel selected for the firing, and purchased locally, comprised cypress pine sawmill offcuts and well-seasoned eucalyptus species firewood, mostly ironbark but with some red gum and yellow box as well. This was a similar fuel mix to that used with success for the firing of the kiln the previous year.

With Kano overseeing, three teams were assembled to conduct the firing in eight hour shifts. An experienced wood firing potter, ably backed by four or five stokers, was charged with running each shift. Students were encouraged to learn by observing and assisting with the stoking.

The firing regime called for a gentle raising of temperature at about 40°C - 50°C per hour in complete oxidation to 850°C in the first chamber, with stoking confined to the front firebox. The temperature was then raised more rapidly until a maximum of around 1300°C was achieved by controlled side-stoking in conjunction with judicious front firebox stoking. Throughout this process the kiln was fired in reduction, often heavy, with frequent raking to stimulate additional fly-ash deposits on the pots. When the first glaze melt was detected, the kiln was soaked for several hours. A second melt was then sought and achieved and the earlier procedure of soaking in reduction repeated. Midway through the firing, efforts were concentrated on the side-stoking of the rear chamber to raise temperature there, and to even out the temperature throughout the entire kiln. For the final six hours of the firing, the kiln was slowly cooled in reduction until the temperature had fallen to about 1050°C. The kiln was then clammed up and allowed to continue cooling until it was cracked and then opened and unpacked three days later.

The progress of the firing was monitored in the early stages with the help of a series of four probes inserted at key points along the spine of the kiln. These were connected to two pyrometers, employed mainly to gauge temperature rise and variation only, as their accuracy to record exact temperature was viewed with scepticism. Cones were not used but glazed tiles were drawn from the kiln at critical stages of the firing, as well as the *setoguro* teabowls mentioned earlier. As temperatures crept over 1000°C, glass formation, the radiant colour of the pots and ash deposition were the prime determinants used to read the kiln from this stage onwards.

Conclusions

This was, by and large, a successful firing with many splendid pots coming from the kiln – especially those from the rear chamber and those from saggars with shino glazes. Some ash glazed pieces were attractive but it was obvious that more experimentation with both clay bodies and the glazes themselves is

During the firing. After stoking the firebox, flame belching from all ports

necessary. The same may be said of much of the *kiseto* and *nezumi shino* ware taken from the kiln. Perhaps the most beautiful pots to emerge were the unglazed ones where surfaces had picked up fly-ash deposits – greens, greys, yellows, pinks and near whites, and rich red and vibrant orange flame flashings. A few had a fine *Bizen* quality about them. The best of these were those made from clay known to respond well to wood firing. Interestingly, some of the finest pieces came from the kiln's rear chamber.

The 72-hour firing went largely according to plan. Soon after the temperature reached the high range it became clear that the packing was proving successful. Hoped for flame paths were being realised, temperatures were evening out with few noticeable cool or hot spots, there was little difficulty in maintaining the kiln in desired oxidation/reduction cycles, responses to stoking were rapid and, as expected, the kiln's structure was showing no signs of stress or weakness. On opening the kiln, few collapsed shelves or broken pots were found and most of the fuel had burned down to well combusted ember beds. The modified kiln also proved to be substantially more efficient in terms of fuel use. About 10 tonnes of wood was burnt – six tonnes of hardwood and four of cypress pine compared with approximately 15 tonnes during the previous year's firing which was of the same duration.

The present kiln is hopefully only the first of an array of different kilns to be built at Kano's Dubbo property. When Duncan Ratcliffe, head of the Ceramics Department at Dubbo TAFE, and the first professional potter from Australia to work with Kano in Japan, returned from his two month visit in 1994/5, he constructed a small brick catenary arch kiln. This one cubic metre capacity 2-burner gas kiln was designed specifically for bisque firings and salt-glaze work. In time Kano hopes to add two new 'pure Japanese' woodfired kilns to his Dubbo complex: an anagama and a noborigama, again utilising local materials and with the help of Australian colleagues and know-how.

REFERENCES:

1. *Fire-Up Gulgong* was held in 1993 at Gulgong, NSW, at Janet Mansfield's pottery.
2. Minokamo is adjacent to Tajimi and Seto, home of Shino and Oribe wares.

Dick Aitken is a Canberra-based landscape consultant and practising wood firing potter.

Magic in the Mountains

Laana Fishman describes a woodfiring workshop at Nolan Babin's studio in California

AS WE APPROACHED THE FORESTED VALLEY of Lake Concow, about two hours north of Sacramento, California, our anticipation heightened. We could see smoke rising in the distance. Finally, at the end of a steep, tree-lined dirt road we found ourselves in front of Nolan Babin's neat, new pottery studio. To our surprise, the suggestive plume we had seen rising was from a neighbour's farm where a horse pasture was being cleared. We remember it now because it was the only significant smoke we saw during the next 11 days. Though smoke was missing, all the other prerequisites for a woodfire workshop were present: clay, wood, fire and extraordinary people. In less than two weeks, this magic combination produced spectacular treasures and memories for us to take home and cherish.

I remember that first evening when Nolan showed us work and slides from previous firings. We secretly thought that either previous participants were more talented than we, or there was magic in this place. Nolan was pleased with our enthusiasm and began to share this magic with us.

Above: Firing the Dragon. Photo: Mike Watson

From the back of the kiln, viewing the chimney and two top stoke holes (cone 10). Photo: Mike Watson

In ancient times, blacksmiths were considered shamans because they knew how to mix fire and iron to create shapes and forms, because they studied and paid attention. I have been working with woodfires now for several years. By studying how the wood, flame and clay combine, I have achieved, not magic, but a certain amount of control over a medium which, for the most part, is not available to the ceramic artist.

Unfortunately, even with experience and the great setup here, we can only do woodfirings a couple of times a year: during academic breaks and at the beginning of the summer, before the forest fire season. I put on these workshops because they give me an opportunity to be a teacher in the truest sense of the word. I become the creator of an environment which allows students to learn and discover from each other. I learn with my students. My workshops are structured so that as many as 15 ceramic artists have an opportunity to work together for four days, before we load the kiln. We all influence each other, sharing techniques, sharing clay.

Preparation is crucial to all aspects of woodfiring. We spent the first days making pots, chopping wood, cleaning shelves and preparing the kiln. When we were ready, the kiln was loaded with our still green clay and the firing began. The participants were divided into teams of three, to work three-hour shifts. A typical schedule was three hours on and nine hours off, with wood chopping in between. The firing began slowly, with almost a day to candle and take the greenware to the point where the water was completely transitioned to a gas and had been driven off.

Throughout each firing, I am always concerned about how consciously each shift is taking on its responsibilities. If the person calling the stokes fails to call them soon enough, or calls them too soon, kiln temperatures will drop, and the end results will suffer.

Barry Fishman. Red stoneware, black slip. Photo: Kathy Murphy

Pots from the firing. Left to right: Patrick Boland White stoneware; Patrick Boland, Black slip over black stoneware; Barry Fishman. Red stoneware. Photo: Kathy Murphy

The same is true if stokers are laggardly in adding wood after the front fire box is stoked, or if the stoke boxes get too full of charcoal and ash. Participants are really responsible for their own shifts. I have to trust that each person will work appropriately and that each team will accommodate the inadequacies of its membership. As it turns out, team coordinators seem to develop slightly different strategies for doing the job (how much wood to add and where) and stoking rhythms vary.

In addition to his willingness to share his experience with us, Nolan provided us with a good kiln. For workshops, a woodfire kiln needs to be large, big enough to fire the work all of the ceramists have made for the occasion. At the same time the number of ceramists is determined by how many people it takes to keep the kiln going. Kiln design is being continuously refined. So far it has been rebuilt three times; each time with improved results. As currently constructed, the kiln nestles into a hillside. Its 200 cubic foot volume is contained by cement and brick. A front firebox, three stoking ports and a rear chimneystack (which draws from the floor of the kiln and extends ten feet into the sky), complete the structure. Nolan has found that the best way to get the back hot is to feed to that area of the kiln directly; hence, a rear stoke hole. We learned that if we did our job well, most parts of the kiln would reach cone 12. Not surprisingly, ware placed in the corners, although reaching temperature, is only fired by radiation and doesn't show much evidence of the ash deposits. The rounded design of this kiln with its minimal corners pro duces long horizontal flames which lick and caress almost every pot as they reach toward the chimney base. This, claims Nolan, is one of the critical factors. Everything is designed to produce long flames. Even the rhythm with which the wood is fed into the kiln is planned to keep the flame long.

Contributing to the richness of the woodfirings here, is how this kiln breaths. Our firings take place in a constant variation between oxidation and reduction. It is not our intention to simply fire the clay. The ash in combination with the clay is what gives us our extraordinary results. Said another way, it is the fuel that produces the glaze. The longer we fire, the richer the glaze will be. We generally go for about three days. This is a compromise between getting as much ash as possible and the endurance of the participants.

Ah, yes. The breathing of the kiln would be a major factor in determining the quality of our pots. We quickly fell into the rhythm of feeding the fire. Watch the stack. When the flame decreases, call for a stoke. When the front box is stoked, wait a few seconds for the flame to catch and then stoke your port. *Voila,* the flame once again comes to life in the chimney. This ritual is repeated at regular intervals. Depending on the wood and on the temperature inside, stoking takes place every 40 to 50 seconds. At the end of our shifts, we knew we had been working. Later, during one of our communal dinners, Nolan shared more of his experience with us.

At least a dozen factors contribute to the richness of our results. I like to use as much hardwood as possible. This, of course, can create problems. If the wood is too green or if the pieces are too large, the flames will be cooler. The type of wood makes a difference. Soft woods are hot and burn fast, while hardwoods are hotter but take more heat to begin burning and burn more slowly. Varying the size of the pieces of wood you feed into the fire, create different length flames. This firing is about 80% madrone and we should get some great ash. But look at how much work it was to split the wood, even using a gasoline-driven log splitter. The denser the wood, the thinner the sticks of split wood have to be to keep the fire burning at its most intense level. The madrone, with all its twists and knots, was much more work than oak or cedar would have been.

The actual clay body itself, its ingredients, are crucial, and so is the shape of the vessel. The ash has to be able to react with the surface of the clay body. Objects with shoulders

Nolan Babin, Kim Lazaroff and Frank Turdici tending the kiln. Photo: Mike Watson

tend to collect colour more than those with straight sides.

How the kiln is loaded will also affect the results of the firing. Pots need to be stacked both to create and to take advantage of the path the flame follows. The flame must be allowed to flow freely. When loaded properly, the pots will be like rocks in a stream, obstructions which create turbulence and slow the flame and allow as much ash as possible to be deposited.

Cone 14 over-fires everything and glazes become runny and muddy. Cone 9 will be dull. When I do a firing, I am not aiming to produce just one, single good pot. With 15 people participating, we need to have a kiln full of gems. That's our goal; though, of course, it is not a guarantee.

I know that a big part of my job is keeping people on track. We can 't have some hot-shot coordinator deciding at 2am that they are going to see how hot they can get everything. They might melt the kiln. I have to be like a parent, allowing participants as much freedom as possible, but ever ready to pull in at the appropriate time.

After we unloaded the kiln and are sitting around talking quietly on the last evening, our conversation returns again and again to how spectacular this pot or that sculpture turned out. As we try to express our joy and satisfaction to Nolan, he becomes serious and thoughtful.

What I really do is create a process. What I am doing is about process. It is not about philosophy, or religion. I don't look for symbolism in the fire or other arty stuff. When we're firing, I don't have time to think about that. I am involved in process.

What we have produced here is extraordinary. These pots can stand proudly beside woodfired work produced in any century, anywhere in the world.

Our goal is to raise the standards of woodfiring. I think that we can build on what was done thousands of years ago. We can use the information and technology which is now available and improve the product; set a new standard of clear colours. I don't think that the ancients had it all under control, and neither do we, but we can still learn and can produce to a new standard of excellence.

Magic in the mountains? Yes. I can't wait to go back.

Laana Fishman is a potter and writer from San Pedro, California. Nolan Babin conducts workshops each year at his studio in Concow, California.

The Kiln and Foundry Facility Western Oregon State College

James Harris writes on Frank Boyden's design and construction for a kiln and foundry facility

Above: North and West walls

THERE IS A NEW BUILDING AT WESTERN OREGON STATE COLLEGE which houses a kiln facility and bronze foundry. It sits shimmering with reflected light in the midst of the old brick buildings which are the mainstay of this beautiful small campus. The building is set apart by its diminutive size and its soft reflective surfaces of aluminum and a sense of mystery relating to the imagery cut into the surfaces of the walls, doors, windows and gates.

The building is the work of ceramic artist and sculptor, Frank Boyden, who was commissioned to design and construct its walls through the Percent for Art Program administered by the Oregon Arts Commission. The structure was conceived by McBride Architects of Portland, Oregon, and its form and roof lines were designed to complement the roof and dormer lines of Campbell Hall, the gothic-style building behind which it is located. Campbell Hall is the oldest building on any campus in Oregon. Erected in 1870, it was constructed from sandcast bricks made from clay scraped from the immediate area and fired in scove kilns. Campbell Hall was recently remodelled to house the university's now extensive art department.

Boyden designed and built the walls of the kiln and foundry building during 1995. The structure is made of steel, sandblasted concrete, sandblasted glass and large 0.5 in thick aluminum plates. The building is small, 25 x 25 ft, and its interior is divided in half. One half houses kilns and the other a compact bronze foundry which Boyden designed. The foundry area opens

North and West walls at night

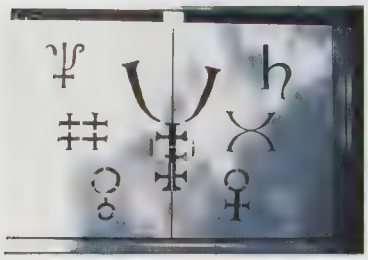
through a pair of aluminum plate gates to a courtyard, lawns, and a small forested area. Boyden, who has worked extensively in clay and cast bronze, designed the space with frugality and sensitivity, working closely with the art faculty who will use the spaces.

Boyden was trained as a painter, printmaker and art historian. He started working with ceramic materials in 1969 and his work is well known for its sinuous incised drawings of animals on vase forms and his vast knowledge pertaining to the firing of wood kilns. During the past 10 years, this artist's work has expanded to include large and small scale sculpture primarily involving cast bronze and stone. In those 10 years Boyden has melded his knowledge of ceramics and his knowledge of the craft movement of the '70s and '80s with his training in fine arts. This has produced a series of powerful sculptural public works where he successfully brings his ideas of craft and function to play to produce massive user-friendly sculpture, parks, architecturally integrated works, and an effective and moving Vietnam Memorial on the central Oregon Coast.

Boyden's ability to present and make reference to environmental aspects of site, to ancient craft, to the sciences and to the history of art is unique. His grasp of history, knowledge of function and contemporary three-dimensional art have served him well in producing a work such as the kiln and foundry facility. His intent was to produce a structure incorporating visual elements that were a reflection of its function. He states that he did not wish the art he made at this site to get in the way of the art that would be made in the facility. "I only wish to enhance it and allow it to function within the design criteria I was asked to work with. Those criteria were that the structure be safe to work in, be secure, be naturally lit during the day and be well ventilated. The college also requested that passersby be able to see what was happening inside."

The visual elements of the building walls were conceived as a showcase of historical and contemporary ceramic forms and decoration, and as a set of alchemical and medieval European symbols which reflected what was being done in the building. Ceramic forms and symbols were hand cut from the 0.5in aluminum plates used for doors, gates, and the 4 x 12 ft panels which form the building walls. A row of 30 x 30 in. plate glass windows spanning one wall bear symbols denoting the four elements. These equilateral triangles are a reflection of the roof structure as well as roof and dormer pitches of surrounding buildings.

West Wall



Gates, 2.4 x 3.6 m. (8 x 12 ft.)

North Wall, silhouette at night

The design of the west wall depicts a brief history of pottery forms which float outward from a central source of flame patterns. It is a lively visual array which the artist describes as a small 'ceramic dance'. As the sun passes over its meridian, light through the cutout forms throws wonderful, luminescent distorted pots and elongated twisting flame patterns along the floor and walls. The north wall is more formal and uses large cutout rosettes and huge open hands. The motifs of the rosettes are borrowed from the inside decoration of Anasazi and Mimbres bowls and from carvings on the end of Han dynasty roof tiles. The central motif of two hands spreading outward is powerful. Boyden says of these, "They are symbolic of craftsmanship and the love and painstaking work which has accompanied the art of ceramics and casting."

Doors and gates on the east and south walls display alchemical symbols cut through their surfaces. The door to the kiln area bears a symbol for clay and the door to the foundry the symbol for bronze. The gates which open up the foundry to the outside court are of special interest. These two 8 x 6 feet gates bear the symbols for the metals which have traditionally been alloyed to make bronze. They are arrayed around a large Y-shaped symbol for amalgamation. This symbol is split by the gates. The opening and closing of the gates is like opening and closing an equation or an idea. It is an analogy for an alloy and for bringing together thoughts.

The use of these unfamiliar symbols throughout the building produces a set of strong, seductive and provocative visual experiences. They function as a magnet to passersby who, when I visited, stopped to examine the building and ask questions. The building is an effective functioning link between the ancient past and the highly technological age in which we currently make ceramics and cast metals. Kaowool kilns, computer-generated kiln apparatus and foundry equipment will fill the structure. Use of the building hopefully will show the links between traditional knowledge of alchemy, clay, and metal casting and the exacting tools of today which allow immense and external and often aloof control. Where it took a craftsman many years to learn to read temperature by eye, now anyone can read a digital thermometer.

This dichotomy delights Boyden. "I feel that those who choose to work with clay and metal should be careful to acknowledge the past and be aware of the immense complexity and the problems which our mentors from the past went through to produce the wonders which we so easily view in museums and take for granted. One must remember the many whose pride, hard work and vision have allowed us to revel in and learn what we so easily pass off as history. That is hard to teach today but hopefully this small building will allow its users to reflect upon the legacy of beauty, craftsmanship and the huge investment of human life which has produced the objects which we revere today. The history of art and craft has shown us again and again the importance of looking at history and learning and using it to advance our own work."

Frank Boyden's work here stems from a world where the definitions of art and craft weave together. His strength lies in melding many disciplines and exposing the inherent sensibilities of function and their relationships to what is usually considered visual art. In this work there is no question that he believes that the two exist together symbiotically and the fact that he has integrated them with architecture is an accomplishment. In a day of ubiquitous nonfunctional sculpture, it is refreshing to come upon a work that is so thoroughly thought out, functional, historically relevant and directed toward specific learning experience.

James Harris has a degree in history from Yale University and is a writer and poet living in southern Oregon.

Imagery and Process

Richard Zakin has discovered a process of making wall pieces that are akin to painting. Here he describes his influences and his processes

Above: Step by step process of wall piece

IN 1994, I BEGAN A GROUP OF TILE FORMAT WALL PIECES and have continued to work with tiles until now. At first, I used a limited range of earth colours. Later I added a more extensive palette of brilliant reds, oranges, greens, blues and yellows using a complex multilayer imagery, especially in my recent pieces. I like the wall piece format and treat it much like a painting. This work with wall pieces reminds me of the time I spent making paintings (from about age 14 until I was 27). As a painter I had a fondness for complex multilayered imagery and now I have found myself returning with renewed fervour to some of the image-creation strategies I employed as a student of painting. I think that this kind of imagery is especially appropriate when used to create wall pieces.

I studied painting as an undergraduate student at Syracuse University and at Brooklyn Museum school. The painter I most admired was the Swiss-German, Paul Klee. His small, jewel-like pieces have great intelligence and intensity. He was an inveterate experimenter with materials and processes (unusual among painters) and liked to use two or more processes in a single work (such as beginning by using a water medium and then finishing with a layer of oil painted work).

Wall Piece. *1994.*
Glassy body, cone 3

Detail of above

I also studied privately with the painter, Richard Pousette-Dart. Pousette-Dart covered his paintings with an overall asymmetrical imagery. His work was process oriented: he would paint a foundation layer on the canvas and then wait for a period of time (three months to years). He then would take up working again on the canvas, adding paint, scraping and scratching it away. He might finish the painting during this session or put it away again for another fallow period before resuming work. He would stand at one end of his studio and I would work at the other end developing my own version of his methods and imagery. This process-based approach has stayed with me and remains a powerful influence.

Character of Work

For me, the wall piece is a private format, one that encourages knotty, challenging thinking. I want to create pieces that encourage contemplation. I want colour and form to be in a state of equilibrium. I don't want my pieces to be about something, I want them to be be something. I am interested in the history of ceramics and know that certain pieces have had a strong impression on my tile work.

I am especially affected by Iranian tiles from the time of the building of the great mosques. The tiles of Isfahan are rich and convey a sense of unity, serenity and beauty. Their imagery is abstract (the appropriate imagery for Islamic houses of worship), the compositions cover the tiles and lack the strongly centered character of Western art.

Above: ***Wall Panel.*** *1995. Above left: Detail of above*

I see myself as a process-oriented ceramist. I think about process, I write about it and I use process-oriented strategies when I create my work. I often develop a project around a process-related problem and then spend all my available time trying to solve this problem. I plan many of the aspects of the work beforehand. I do not know what forms or colours I will use – that is a spur of the moment decision. I do know what kind of work strategies I can employ. I use those that seem right to me when the time seems right.

In making imagery of this sort I am trying to make my own realistic reflection of the world. It reflects not the surface appearance of the world but rather its inner workings. I want my pieces to remind the viewer of the patterns created by the growth of organisms – all sorts of organisms from plant life to human societies. It is a matter of chance within an orderly system – chance and order in a delicate balance. Imagery of this sort is never sweet or emotional or hopeful. It tells no story but the story of its own creation. It has its own inevitable logic. With luck and skill this imagery will be complex, interwoven, shifting, multilayered and it will have the look of an inevitable event.

Process

The wall piece format is consonant with a process orientation. Wall pieces can have the complex imagery that process-oriented creation encourages. When I began developing these pieces I had a number of goals: I wanted to create a group of new clay bodies and to develop a new image creation strategy.

Above: ***Wall Panel.*** *1996. Above right: Detail of above*

Reading Tom Thompson's article, 'What's Next', in the computer journal, Byte, April, 1996, about the way computer chip fabricators make their processor chips, it occurred to me that this information was germaine to my ceramic work. It read, "Companies make ICs by layering patterns of metal or chemically treated (ie, doped) silicon, one on top of another, on a die of silicon. The layout of these patterns, composed of either conductive or insulating material, builds the transistors that make up the ICs logic gates... Logic gates are built, step by step, in a cycle where another doped layer gate applies, followed by another coating, another mask exposure and more etching." My layering is a similar process.

I wanted to create low clay content bodies of some richness and to create an imagery that was consistent with the character of these bodies. I ran into trouble with these new bodies quickly. At first they were difficult to formulate and it took me weeks to know which combinations of materials would work, how much clay was likely to be useful and what fluxes I needed. Once I took my first successful test pieces from the kiln, however, I was convinced that I was on the right track. These formulations had a unique and other-worldly quality. In a few weeks I was able to develop five or six bodies in various colours. I came to appreciate their qualities. These clays change their shape in the fire. Forms (especially the edges of the forms) are marked by a subtle swelling and take on a soft, rich, full character. Furthermore, form elements slump and drape over each other. This draping causes them to conform to form elements placed below them and partially reveals the outlines of these underlying shapes. They are improved by the fire. These bodies allow me freedom in my forming and firing strategies. I can place unfired elements over an already fired piece. The elements I have added slump and bond with the tile in the fire. I can merely lay one element over the other and the top element will slump and melt into the rest of the piece and bond with it during the fire. After I study my pieces as they come from the kiln, I decide whether to develop them further.

I began with a group of test tiles to test my materials and work strategies. My approach is not theoretical, I have merely become a good observer. I try various image creation strategies, put them through the fire and observe the results. I made a number of discoveries when I started this testing program. As I placed one element upon another during the building process I saw that I was simultaneously creating that which normally I would have to create separately. I was creating relief imagery, introducing colour, shiny or matt surfaces and texture. I found the simultaneity of this process satisfying. The colour and glassy surfaces of these bodies were part of their makeup and not added after the forming process was finished. They needed no final glaze covering; they were shiny. Their shine, however, seemed to come from within. The panel format allowed me to concentrate on the layer image aspects. Each layer is composed of clay elements of a similar type. Within each layer I am rigorous in employing the same image elements. I then apply another layer of imagery. This is where I create contrast because I use different imagery in each layer.

Above: ***Wall Panel.*** *1996. Above left: Detail of above*

I vary layers made from bodies with glassy surfaces with others that are matt and still others that are highly melted and shiny. I also deal with my colours in the same way, contrasting a layer of one colour with a layer of another. I contrast soft and crisp imagery. I use clay bodies with different degrees of transparency or translucency. I continue until the surface is covered with a dense interwoven pattern. In my recent pieces I start with an open grid base rather than a solid base. This lets me create openings in the surface of the piece. These openings, too, add interest.

Construction

I form my pieces on the kiln shelf. These bodies melt and will stick unless I isolate them from the shelf. I dust the shelf (heavily) with powdered soft brick. I then place a sheet of paper on the prepared kiln shelf and build my tiles on it. I start with a base clay. I make coils with this clay and use them to create a grid form. Then I use the same clay to make planar elements which I add to the structure. These planar elements do not lie flat over their support but rather conform to it creating a rumpled effect. I am now ready to use a second clay. I add more grid work and planar elements. The imagery is a combination of serpentine linear elements, rumpled planes and dark openings. I am now ready to add my coloured clays. I form my coloured clay elements so that they look as if they are floating above the less brightly coloured imagery that they rest upon. Because my clay body formulations are glassy, they take colour well (in the manner that we are accustomed to in glazes) and are rich. From natural clays I can get true whites, buffs, ivories, greys, tans, orange ochres and blacks. I also use commercially produced stains that give me access to a wide spectrum of brilliant colour: brilliant pink-red vermillions, oranges, yellows, plums, greens and blues.

When the piece is dry I move the tile on its kiln shelf from my studio to the kiln. I fire the piece to cone three. When I remove the fired piece from the kiln I study it for a few days to decide if I have finished it or if I think it needs another firing. Because I can refire, I have developed a special kind of rhythm of work that I use in creating these pieces. I can open my kiln with a feeling of curiosity instead of a feeling that this is a make-or-break situation. I can think about a piece and wait until I call it finished. It is this rhythm that helps me establish the feeling of equilibrium I want in my work.

Technical Details:
Typical clay body recipe:
Name: XMay 2.2

cone: 3 firing
temperature 1168°C

clay: 30
non-clay materials: 70

Silica: 14
Potash Feldspar: 30
Boron Frit: 8
Talc: 18
Ball Clay: 30
This clay body is a light ivory in colour.

Richard Zakin is a ceramic artist and author of a number of books on ceramics

The Ceramic Research Unit, Centre for the Arts, Hobart

Penny Smith outlines the research being undertaken at the Centre for the Arts, Hobart, with reference to specific projects

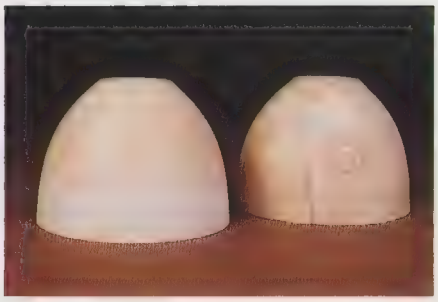
Matti Sorsa, Ceramics Research Unit, working on a handle model

FOR THE PAST TWO DECADES, THE CRAFTS, PARTICULARLY CERAMICS, have flourished in Tasmania, buoyed by a steady stream of graduates from the tertiary education system who emerged with traditional hand production and basic studio management skills. Many of these graduates were committed to the idea of an independent, self-employed life-style and managed to sustain themselves with extremely modest incomes. Often it was the denial of industrial techniques and the symbolic gesture of a free spirit reflected in the 'hand-made' that attributed to the popularity of the work of these early studio potters. However, with the increase of greater cultural diversity and a more sophisticated buying public, many studio potters were unable to compete with the more attractive, consistent supply, and commercially viable products that were being imported by the specialist stores and boutiques that emerged during the 1980s.

It was also during the 1980s that turbulent educational rationalisations were taking place around Australia; art schools had to find new partners in order to survive. The Tasmanian School of Art in Hobart, ousted from its Hobart-based College of Advanced Education site on Mount Nelson by refusing to be re-located in the north of the state, was the first art school in Australia to find a new home within the hallowed chambers of the university sector. In 1986, the ceramics studio was the last studio to leave Mount Nelson, to join its fellow studio areas within the custom designed Centre for the Arts. The city-based art school campus of the University of Tasmania is currently situated on Hobart's waterfront in the renovated Jones & Co. Jam Factory building.

The absorption of Schools of Art and Design into the University sectors became a reality for more and more institutions during the late 1980s and early

Original plaster turned up model with hellac coating



Cup model centred on plaster base with recess. This is shellac coated, soft soaped and greased

Metal back, oiled inside, placed over turned cup model

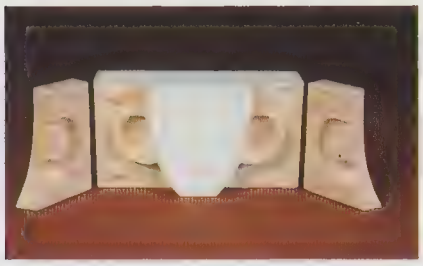
Plaster is poured inside metal back, later removed, thus forming the cup mould for the jolley machine

Cutaway of jolley cup mould showing plaster cup and cup template. The plaster cup is used to set the template for each run to ensure even thickness

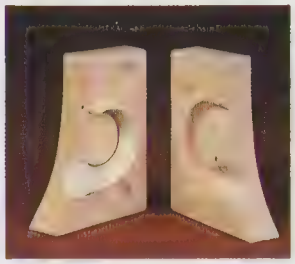
Cup mould in jolley head, cup template attached to jolley arm

Top row: Styrene foam cup handles used as sketches. Bottom row: Plaster cup models in progress

Single cup han model from wh double handle model is produced. A master plaster case is made an then the workin moulds are mac



Set up showing handle position to cup to produce resin handle mould



Resin handle mould. Each cast leatherhard handle is placed in this mould and is trimmed with a flexed knife. The curve of the mould fits exactly the curve of the cup profile

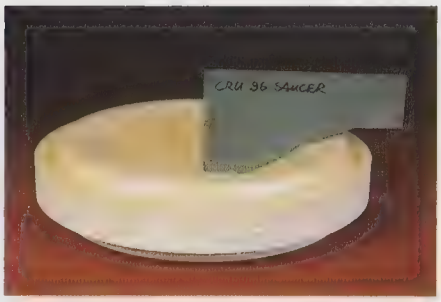
1990s, that brought with it a number of unique teething problems, many of which are still being resolved.

Professor Desmond Freeman, Associate Dean, Faculty of Design, Architecture and Building at the University of Technology, Sydney, presented a paper at *Convergence and Divergence*, a conference held under the auspices of the Australian Council of University Art and Design Schools at the Centre for the Arts in Hobart in 1995. In it, he discussed several issues that the inclusion into the university system have brought upon art and design institutions with regard to the quality of its teaching and learning at a University level. While he was referring specifically to design education, many of his ideas were arguably relevant to the teaching of ceramics. As is evident in ceramic studios within art and design schools, the current state of teaching and learning in this area is undergoing alarming changes. On the whole, ceramic education in Australia has been slow to respond to society's changing cultural and technological needs, and as a result, I believe, failed to equip its graduates with the contemporary needs of a fast moving commercial world. "Our graduates are poorly equipped to take their disciplines forward into a demanding technologically-based, professionally-oriented world of commerce and industry."[1] Like many other institutions, the University of Tasmania and, in particular, the Centre for the Arts, has been working hard to reassess its role within society so that it can better position itself in servicing the needs of its future clients.

As part of its overall strategy, the Centre for the Arts has been committed for some years to the idea of small scale industry as an economic viability, with much work already having been done in the field of furniture and ceramics, both at undergraduate and post-graduate training levels. The Centre for Furniture Design was developed in 1990 with federal/state funding as part of the Helsham compensation package to instigate reafforestation and skills training within Tasmania. The Centre for Furniture Design's brief was developed to produce post-graduate training facilities and projects that would interest the Tasmanian furniture industry in developing products by applying designs produced from within the Centre.

This model was used to develop the Ceramics Research Unit, established as part of the ceramics studio within the Centre for the Arts, during the early

Metal saucer template to turn plaster saucer set. This is coated with shellac and soft soaped

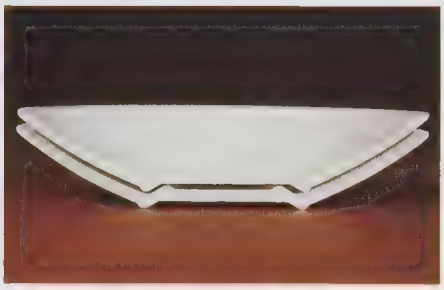


Saucer case base is cast from saucer set

A plaster ring back is placed in position over the case base and plaster poured to form the saucer mould. A ceramic plug is placed in the mould

Removal of plaster ring back showing saucer mould. NB. The size of the pour hole in the plaster ring back is crucial

Cutaway of plaster saucer (in red) to illustrate the saucer template and how this is used in setting up the run



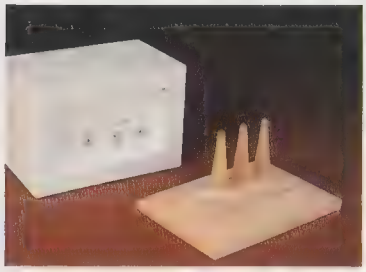
Cutaway plaster saucers to show stacking detail

1990s in order to upgrade its research profile and to broaden the vocational scope of its courses by offering specialist post-graduate training. The Ceramic Research Unit aims to encourage team design effort, through developing skills in small scale industrial methods that will continue to foster the development and growth of flexible innovative ceramic production practice.

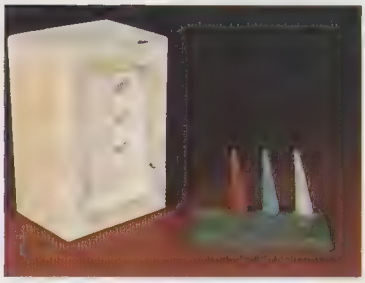
That "our graduates often have a poor appreciation of the essential techniques of teamwork" [2] is testimony to the legacy left by the necessity of independent studio potters to keep the fruits of their research a secret as a matter of survival. "Those who graduate believe that professional (design) practice can be pursued as an individual, rather than as an informed and contributing member of a multi-disciplinary, multi-talented team where professional respect rather than the jealous guarding and relentless pursuit of one's own approach is normal behaviour."[3]

Inclusion into the university system has changed this attitude and challenged the notions of research and its outcomes by providing teaching institutions access to DEET sponsored Australian Research Council funds which require the publication of research findings to benefit the community as a whole by generating ongoing intellectual dialogue and practice.

The Ceramics Studio's Research Unit at the Centre for the Arts addresses its research towards solving the problems associated with successfully sustaining small scale ceramic studio practices by creating systems of production and



Resin case of cone setter, and mould



Cones are placed in the correct order, upside down in the plaster mould with cone ends projecting by 5 mm. Fireclay is pressed firmly into the remainder of the mould space and scraped across the top of the mould

marketing. This is being addressed through projects that combine the flexibility that the small scale pottery can offer with high quality design principles, and combining it with the adaptation, and scaling down, of efficient industrial manufacturing methods. These investigations are intended to illustrate that faster production methods will result in more consistent supplies that can respond more readily to new market demands by small producers.

Current ceramic tableware manufacturing methods within large-scale international industries include sophisticated automated processes capable of producing huge mass production runs. This high volume output relies on dust pressing and jiggering flat ware (plates, saucers, etc); jolleying and casting hollow ware (cups, bowls, etc), and direct and indirect screen printing decoration that requires multi-firing. These procedures are beyond the means of small craft studios which struggle to maintain quality production, consistent delivery times and high market demand.

Competition for the world tableware market has become fierce during the past few decades. Imports into Australia testify to the success of countries such as the Philippines and Indonesia which have bought the technology, copied the products and combined it with cheap labour to create competition for the traditional European factories.

The need to research and develop products for a changing society becomes increasingly compromised for ceramic industries when their financial survival is tied irrevocably to the scale of their production. There is a vicious production circle as the cost of introducing new products creates major disruption and loss of time and money to the factory in the necessary re-tooling process. The research within the Ceramic Research Unit aims to demonstrate that by scaling down the features of large industry, a more flexible approach to production can be achieved.

To date, the Ceramics Research Unit's progress towards fostering innovative design and manufacturing approaches to small scale industrial ceramic practice has been funded on the basis of project driven research grants. Applications for these are fiercely competitive, but the CRU team of myself and Les Blakebrough has been successful in gaining support from its internal university research funds and from the Australian Research Council.

The Ceramic Research Unit's activities started with modest pilot schemes including a limited edition cup and saucer project and gourmet mustard pot run. This exercise was to be produced by a team that included myself and Les Blakebrough, two current post-graduate and two under-graduate students, and was to provide income for the students and a small profit to the Unit. The exercise also highlighted the need to upgrade our production skills if we were to take advantage of our design capabilities.

In 1995, we succeeded in obtaining a three-year grant from the Australian Research Council that enabled us to embark on designing specialised production equipment, begin a number of speculative design projects and to employ a full-time professional model/mould maker. Matti Sorsa is currently employed by the Arabia tableware factory of the Hackman group, in Helsinki, Finland, and is on loan to us for an extended period. Sorsa's prime responsibility to the factory in Helsinki is to assist selected Finnish artists and designers employed by Arabia to develop their designs from concepts, through models and moulds, to the final prototypes for the bi-annual production of the Pro Arte Collection. This collection is a series of limited edition, individual artists' works produced in a special workshop within the main factory that is in addition to the standard factory table and gift ware items. Sorsa

has already proved invaluable and has taught those who have worked beside him many new ways of working. Leicester Cooper, a recent post-graduate student who developed a range of slip-cast work for his final year submission, is now being trained by Matti Sorsa.

A major project currently under way has been to design a flexible production system that capitalises on two distinct designs, but utilises one set of production tools. We have developed a cup, saucer and side plate to be used in conjunction with an automatic roller machine being built to our specifications. The machine has been designed to accept a range of heads that will receive jolley (cups and bowls) and jigger (plates and saucers) moulds in varying sizes. Tear-drop shaped stainless steel rollers that echo the internal form of the jolleyed ware, and stainless steel flattened domes that reproduce the foot rings and underbelly of jiggered ware, are fitted to the forming arm of the roller machine to compress and form the desired shapes. While the two ranges depend on the same machine to produce the limited editions, the faces of the moulds themselves have been designed to provide the difference in each of the designs.

By leaving one set of moulds plain, my cup/saucer/plate design provides a 'canvas' that is to be decorated by six graphic artists, printmakers and painters; the decals used will be produced within the Unit. The development of these 'in-glaze', high temperature decals is the result of a grant I received for 1996 currently employing a second post-graduate student. Andrew Remley is assisting with the development of a software design package (similar to DeskArtes discussed in *Ceramics Technical*, No. 1)[4] to generate flattened images on the 3D ware; the artist's design that can then print computer prepared art for screen printing decals. The ensuing sets will be launched as an artist's limited edition run of 200 of each design.

Les Blakebrough's design, on the other hand, has been developed with a distinctive textural decoration, carved on the face of the mould, to create patterned undulations on the inside of the saucer and the exterior of the cup, sections of which can be decorated. Blakebrough has also been successful in obtaining a grant in 1996 to investigate the development of resin roller heads (for both jigger and jolleyed ware); these will suit the automatic roller machine currently being built and will provide an economically viable alternative to the more expensive stainless steel rollers.

Flexible, economically viable systems for the design and manufacture of ceramic ware suitable for small business conditions, while retaining the reputation of traditional craft excellence, continue to form the basis of our research and development.

Cone setter, before and after firing.

FOOTNOTES

1. Freeman, Desmond. 'Late Twentieth Century Design Education in Australia.' *Design World* Magazine, 1995.
2. ibid
3. ibid.
4. Becktold, Jeroen. 'Ceramics in the 21st Century.' *CeramicsTECHNICAL*. No. 1

Penny Smith is Senior Lecturer and Head of the Ceramics Studio and the Ceramic Research Unit, University of Tasmania. The Ceramic Research Unit is planning a professional mould making workshop for those interested in the type of processes discussed above, and would welcome enquires. For information, contact Penny Smith: telephone (002) 384300, or fax (002) 384308. Photography by John Farrow.

Potting at Petra, Teaching in Taibeh

Katherine Smyth writes about a ceramics project in Taibeh, Jordan

Above: Wadi Musa, entrance to Petra

WHEN I WAS WORKING IN LONDON in 1993, I heard about a program which had been set up to teach pottery skills to young Jordanian women. It was being run by an English potter, Jim Mason, who, at that time, had been living and working in Jordan for 11 years. I had completed the three-year full-time ceramics diploma course at the National Art School, Institute of Technology, in Sydney, and was eager to join such a program to use my skills and to experience life in a somewhat remote village in Jordan. Initially, Mason, a Yorkshireman, travelled to Jordan to set up a ceramics department at Yarmouk University in the North of Jordan. Later, as the result of an applied research program, he began working for the Queen Alia Social Welfare Fund, a Jordanian Non Government Organisation, with the aim of teaching pottery skills in Taibeh in the south of Jordan.

Taibeh sits on top of a horseshoe-shaped mountain about 12 km from Petra, an old city where settlement dates back 12,000 years. Petra is mostly famous for its huge buildings and tombs carved out of solid sandstone by the Nabatean people 2000 years ago. The road between Petra and Taibeh looks over Wadi Musa or the Valley of Moses. The people of Taibeh number about 4000 – mostly descended from the nomadic Bedouin.

During his time in Jordan, Mason spent some time researching the Nabatean ceramic ware that had been made in Petra during the first three centuries AD. The research was carried out in conjunction with Jordanian archaeologist, Khairiyeh 'Amr, Yarmouk University, the Jordanian Department of Antiquities and the British Institute at Amman for Archaeology and History (BIAAH). The project included the excavation of a Nabatean kiln and later the construction of a Nabatean-style kiln in another old city, Jerash.

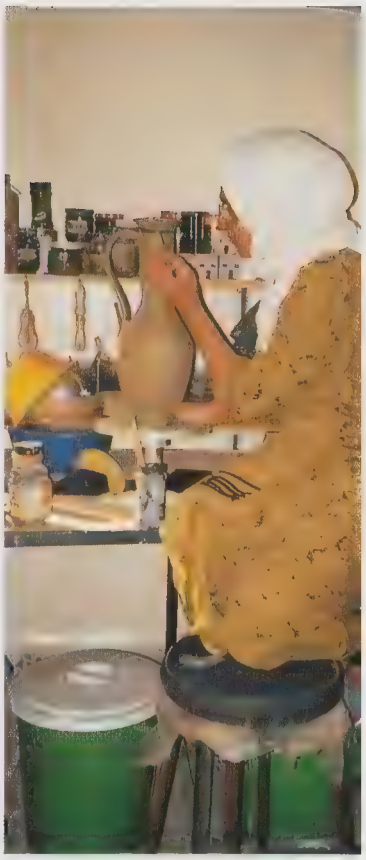
It also included the production of pottery, similar in style to the original ware, which can only be directly copied illegally and is not permitted to leave the country. Following the success of this research project, Mason proposed a further program to teach pottery skills to local inhabitants of the Petra region in order to revive some of the old craft traditions and to develop income-generating skills for the community.

Since its rediscovery in 1812, Petra has become a popular destination for tourists travelling in the Middle East. Ten years ago, the Jordanian departments of antiquities and tourism decided to move the then inhabitants of the city to a more modern site nearby in order to gain more control over the preservation of the site, the excavation of important archaeological finds and the marketing of it for tourist interests.

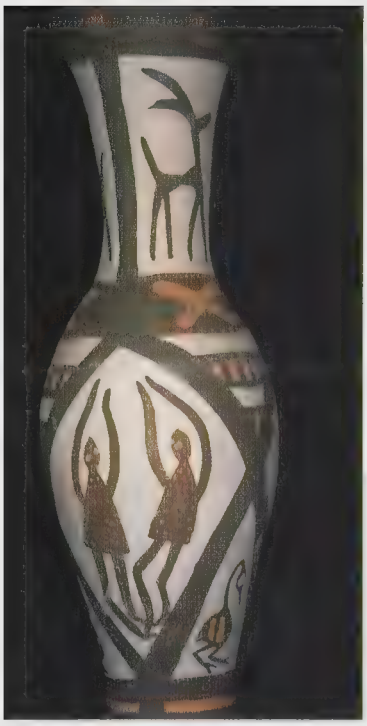
There is a ready market for traditional pottery from the ever-increasing tourist trade. Within the region, Jim Mason, also something of a part-time philosopher and poet, has become a well-known personality, known to the locals as Mr Jim. His Yorkshire accent overpowers his Arabic phrases, which though not vast, enable him to get by in most situations, particularly in communicating his skills at the pottery workshop.

My own language skills were even more limited. There were some challenging and even frustrating times trying to communicate concepts to the girls who had not had any formal art training. Their knowledge outside their own rich and complex culture was limited. One day when playing general knowledge quiz as we often did during classes as part of the daily banter, Mason asked "Who was Michelangelo?" After some discussion, one of the girls volunteered the answer: "A boxer." In this respect we felt as though we were starting from scratch trying to impart some knowledge of Western interpretations of design and art history. During the time that I was there, six of the local women (later there were eight) in their late teens and early 20s came to the studio for five to six hours each day from Saturday through to Thursday. We often began with an hour of drawing, design or painting. Later we would work with them on slip-casting projects, thrown forms and handbuilding. Only one wheel was functioning and even then there were frequent electricity cut-outs during the day. Despite our many problems associated with distance, language, cultural differences, materials and equipment, power and water supplies, we never had to worry about access to clay – it is abundant in the area in numerous varieties, though mostly earthenware. We dug the bulk of the clay from one tried and true spot approved by the local mayor. Other clays which we would use for making slips or experiments were picked up on walks or drives around the countryside. We found clays which fired to rich red, pink, ochre and warm orange, and we used oxides which also occur naturally in the region. As a compromise, we tended to purchase through a ceramics factory for convenience, to make up an even wider spectrum of earthy coloured slips for decoration.

The local clay contained a problematic percentage of limestone leading to pots self-destructing after firing if left untreated. After much trial and error, attempting to process the found clay, we decided the workload was too great and time-consuming for the few hours we could spare in our teaching program. The young women were unused to such physical tasks and not only did we use large amounts in the learning process but we also needed the encouragement of their more successful pieces remaining intact. Mason sought out a commercial plant in the northern city of Salt where the base clay could be quickly cleaned and pugged at low cost.



Hanan decorating her jug, Taibeh village



Above: Katherine Smyth. Handbuilt vessel, slip decorated. 70 cm/h. Centre: White flowers with Petra in background. Right: Two small handbuilt vessels, 12 and 20 cm/h.

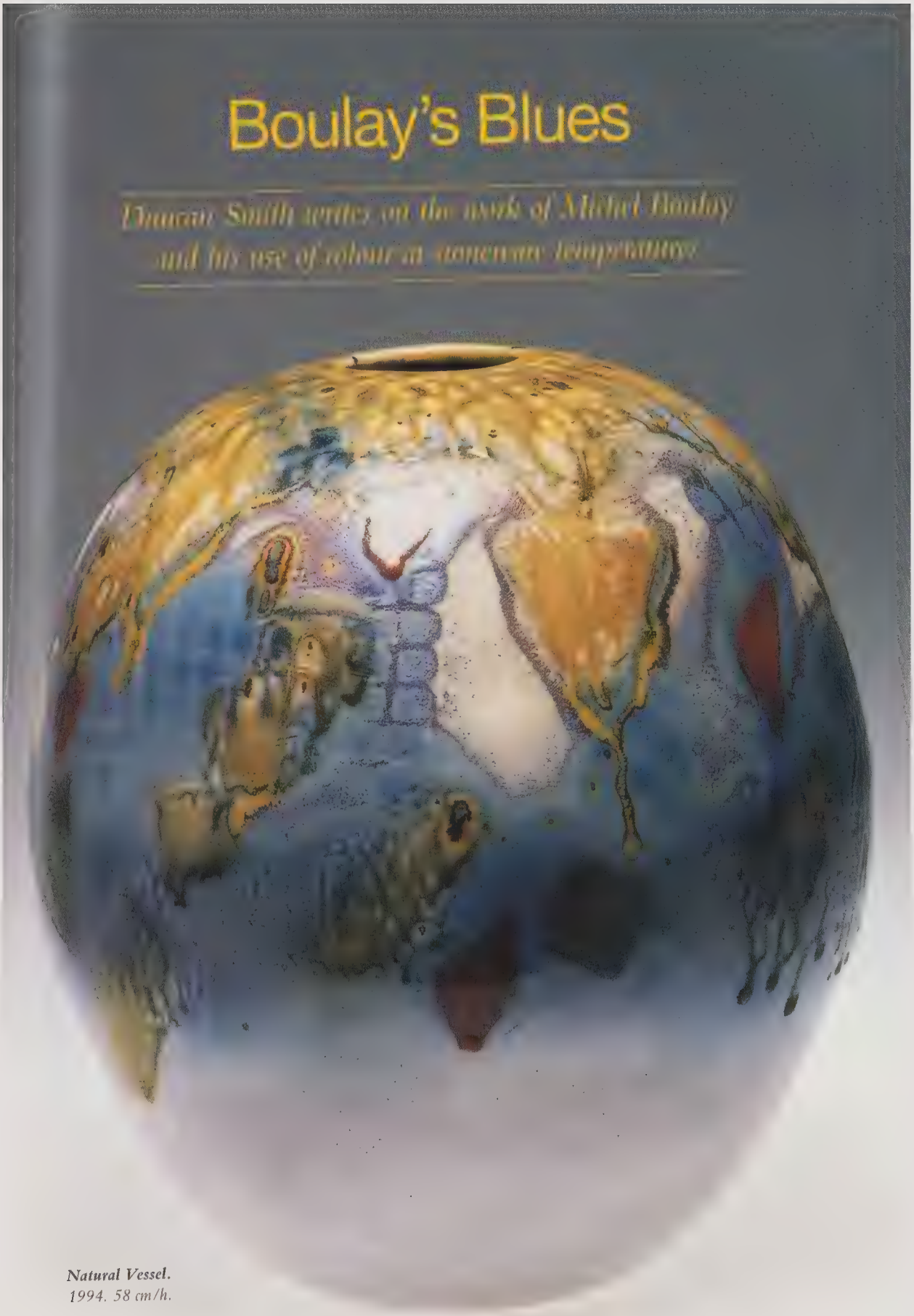
The pots were not restricted to being derivative of Nabatean ware as we felt that for the learning process, a wider spectrum would provide a richer overview and that it was necessary for the students to develop their own creativity in order to include effectively their culture into their work. We did take inspiration from middle to late Bronze Age pots from the region as it was agreed between all of us that these pots were charming both in terms of form and character and still relevant to the goals of the project. The pots were not glazed at this stage. Traditionally, glaze was not used – this turned out to be an advantage for our purposes because of problems with resources.

We had two electric kilns but only a relatively low-powered electricity supply. Possibly a Nabatean style kiln in Taibeh will be constructed in the future, to be fired with agricultural waste such as olives or animal dung but, for the meantime, we had the option to use the simple to operate, pushbutton electric kiln. The pots are fired between 900° and 1000°C – this was the most we learnt to expect of the power supply before blowing the circuitry. Glaze technique is taught but, with limited language skills, this is complicated and it will be necessary to develop glazes suitable to local clay and ingredients; this will need to be a gradual process. The project's aim is that eventually the local women will run the Taibeh studio, having acquired all the necessary skills to make pots to sell to the locals and to tourists, and to teach future generations similar skills. There is, unfortunately, a tendency for marketing experts from various institutions to try to dictate the type of product suitable for a tourist trade. This could result in a production line of simple slipcast souvenirs requiring few skills. It is a matter of concern that the women should receive a broad education and produce a quality product. The project is funded with the assistance of international organisations such as US Aid and Save The Children Fund. At the moment, only a small return comes from the sale of the work but it is early yet. In the meantime, the studio is open to visitors, particularly those who want to share their skills. Simply catch a cab from Petra and ask to be taken to Taibeh, to Mr Jim's – a large white house at the far end of the village. The cab ride costs three to four dollars. The cup of tea at the other end is free.

Katherine Smyth is a practising ceramic artist from Sydney. A solo exhibition of her works influenced by her time in Jordan was held at Craftspace, Sydney, in 1994.

Boulay's Blues

Duncan Smith writes on the work of Michel Boulay and his use of colour as 'concrete temperature'



Natural Vessel.
1994. 58 cm/h.

Above: ***Rainforest Platter.*** *1995. Stoneware, wood ash. 42 cm/diam.*
Opposite page: ***Reflection of Nature.*** *1994. 78 cm/h.*

MICHEL BOULAY WAS BORN AND RAISED IN PARIS, FRANCE, and spent his formative and educational years in this city of culture and artistic endeavour for which it is universally known. His love for the arts led him to pursue a career in graphic design as an advertising designer for SNECMA in Paris. Later travels through Asia led him to Australia, for which he developed a strong affection resulting in a decision to migrate here with his family in 1981. Continuing his studies at the Western Australian College of Advanced Education, he completed a Bachelor of Education in Art in 1982. His interest in clay led him to pursue a course in ceramics as part of his

university degree. This rekindled a passion for painting and the use of colour which later formed the basis for the distinctive painterly style of his claywork. His decision to return to France for three years gave him the opportunity to complete a Graduate Diploma in Ceramics at the Ecole Superieure des Arts in Paris. This provided the foundation for the development of his ideas and the incorporation of his experience with claywork and painting into an integrated artistic philosophy.

Boulay's primary concern is the development and use of colour as a means of expression and as a means of creating an emotional response in the observer. The characterisation of colour, through psychological and emotional responses secondary to the sense perception of reflected light, is pivotal in the process of translating creative thought into action. The movement, feeling and character of colours interplay with the contrasts between contiguous colours. Boulay's sound knowledge of qualitative, quantitative and simultaneous contrasts allows him to create spatial and perspectival effects which liberate the colour field from the surface to which it has been applied.

Boulay expresses some of the ideas he has gathered from various reference sources: "I am using colours as a link to emphasise texture, surface and form. These are the qualities which are brought in highlight. There are so many possibilities. I can play with variations of glazes that are hardly visible. It is difficult to foresee between colour and form; the colour slips away from the potter's intention and carries him from surprise to surprise. The form arises from the colour and allows metaphoric interpretation. The spontaneous events which happen during the creative process have taken a more abstract value. This is a fusion of paintings and pottery through colours which define, create or destroy the form. This creation is always partly an experimentation, a fertile exchange between knowledge and chance. It is not a technical chance but rather an inward chance that we call spontaneity, freedom of expression.

"Contemporary painting spreads a vocabulary of abstract decoration and brought a new meaning to accidental results, such as dipping, pouring, trailing and abstract calligraphy with glazes and slips on the pottery. The potter should be in possession of a free control of materials and techniques and, most of all, the freedom of his artistic expression, so the aesthetic of ceramic art lies in the recognition of the potter himself as an expressive artist-creator. The range of colours available in its display gives to the potter a medium to express the vein of feeling in all aspects. Colours help us to express this world of contrasts, affinities and harmonies of tone. The results can be to display the attention, the sensibility to the nuance of the world, inside as much as outside. The discovery of the infinity of nuances and their expressive echoes develops the capacity of comprehension, enriches the life of feeling in mobility and vitality, releases the f...culties of expression, and favours better exchanges between the oneself – inward, and the other – outward. We go into the colour by an active act and go out again to feel it from outside by contemplation."

Boulay represents a niche of creative artists working outside the field of tradition which has influenced the recent history of ceramics. We see here an art form which pays homage to the tenets and traditions of painting and sculpture, bringing diverse elements of each into the fire to meld and transform them into a fresh and bonafide artistic statement. The style is unique and unmistakable, bearing an enigmatic strength which compels the observer to look closely at the work and apprehend the ideas which have brought it to fruition. Boulay's personal philosophy is centred on the manipulation of colour, contrast and form to create visually exciting and emotionally rewarding

I use a white stoneware body made by Feeney, Queensland. It is easy to throw for small or big pieces and strong enough for large slab platters. It comes in 12.5 kg packs at a reasonable cost. The shrinkage, however, is 16%.

Above: ***Feeling Blue.*** *1995. Stoneware, wood ash. 24 cm/h.*
Right: ***Ceremonial Vessels.*** *1995. Stoneware, wood ash. Tallest 37 cm/h.*

"The gas fired kiln (pictured opposite) is lined with CF fibre, is downdraught and powered by two 1.5 in. burners placed at the back. I bisque fire between 1000° and 1050°C. I use stoneware glazes such as copper red, cobalt blue and celadons, using dry soda ash and wood ash as fluxes. All the glazes are sprayed with a gravity-feed gun. I start glazing at the base of the work, spraying glossy and then satin glazes to form the patterns or background. The dry glaze is oversprayed, trailed iron oxide and copper carbonates applied and, finally, the copper red glaze. Gloss firings take between 5 and 7 hours depending on the load; reduction is medium/heavy starting at 900°C until 1290C. The kiln is soaked for 15 to 30 min, shutting the kiln when cone 10 is fully down. The length of the firing has no effect on my glazes. Sometimes I lower the gloss temperature for underfired glaze effects. If the temperature goes too high, the contrast between dry, satin and glossy glazes disappears.

works of art in his chosen medium of reduction-fired stoneware. By exploring the nature and limitations of the materials at his disposal, and by gathering this knowledge into a vocabulary of expression, he hopes to break new ground and develop new techniques. This work sees the incorporation of wood ash glazes in surface decoration and the refinement of the vessel form. Continued exploration in colour development will be the cornerstone to the evolution of this ceramist's distinctive style.

Duncan Smith is a ceramic artist and writer from Queensland. Photography by Peter Hamilton.

Terra Aria Acqua Fioco

Loredana Müller and Paolo Porelli write about their aspirations and the techniques they use in their pottery workshop near Rome

OUR AIM IS TO WORK AS ARTISANS with a similar idea of creative work. We consider pottery a creative activity through which man develops his practical and spiritual talents.

We work just outside of Rome, near the Bracciano lake. There is no tradition of ceramics here so we feel a little isolated, away from Faenza, Deruta and Castelli Albissola, places where there is a long tradition in ceramics and where pottery is lived from morning to evening. But, small as we are, we continue working and try to exchange ideas with ceramists near and far that we happen to come in contact with.

Our pottery is handmade in a traditional sense and, aesthetically, we search for images tied to natural history for the decoration of our work. We study the structure of nature and synthesise its movements in order to decorate – the surfaces of our pottery reflect these studies. It is a meticulous technique carried out with the point of a pin. When people ask us how long it takes to make our pots we answer that it is as if we wrote pages and pages on their surfaces. And this technique has become a repetitive graphical automatism that changes and relates only to our moods – the surfaces reflect a state of mind during the time we are making the pieces.

We prepare the red clay that we have found and purified before mixing it with some black sand from our lake. When the clay has been correctly prepared we throw the pieces on a potter's wheel. When complete, the pieces are coated with an engobe made with white clay from Civita Castellana, a small town near us. The pieces are then decorated. After the bisque firing we apply

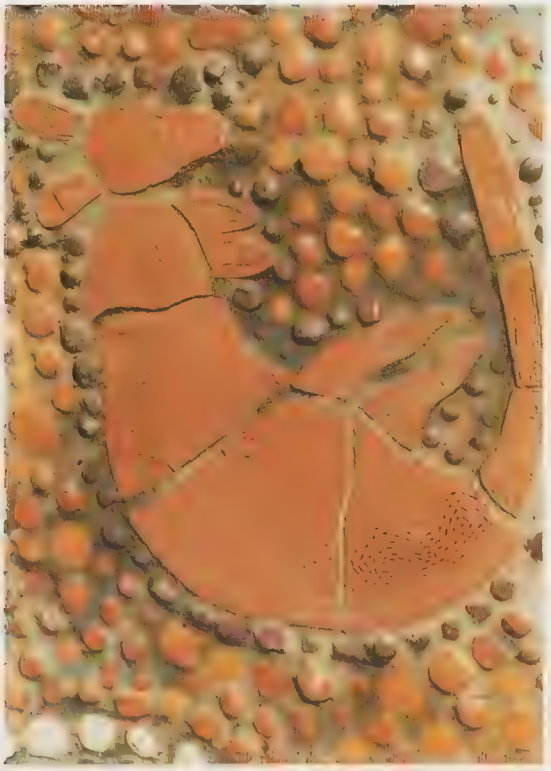
Vase. *Stoneware, engobes, glaze. 40 cm/h.*

an alkaline glaze. The second or gloss firing is in semi-reduction in the lower part of the kiln. There the temperature is higher and the reduction stronger. Sometimes we mix various amounts of iron with the glaze; this way we get a whole spectrum of colours from blue celadon, lavender-blue, olive-green, honey colours to different browns. We also use cobalt.

Our kiln is one of the earliest, a gas kiln made in Deruta. Now we would like to build a new one to have the possibility of firing copper reduction glazes. With our present kiln we are unable to develop the greens and blues that we desire.

We have both studied painting and sculpture at the Rome Academy of Art, but our ceramics have been learnt from experience. We will continue to learn by working. The results that we have obtained so far are satisfying and our aim is to continue this way of working because we want our pottery to become more known locally in the area where we live. But we would also like it to be known among others in the field of pottery today.

Loredana Müller and Paolo Porelli live and work in the via Anguillarese, Rome



A Riverland Tapestry

Three large-scale ceramic projects were constructed at the Goulburn Valley Grammar School, Shepparton, Victoria. Angus Cameron reports

IN THE THROWAWAY AGE OF PLASTICS, satellites and the microchip, it is refreshing to find a school in touch with the tactile nature of the earth. Through the medium of clay, students at Goulburn Valley Grammar School are using their imagination to express personal observations about the nature of our environment and heritage. The school is located near Shepparton, in the heart of the Goulburn Valley in north central Victoria and has undertaken several major ceramic projects with groups of students and visiting artists under the direction of the art teachers: John Lancaster and myself.

The first project was completed in 1993 with artist-in-residence, Rose Cameron. The brief was to produce a wall mural reflecting the riverlands and natural environment of the region and Cameron worked with more than 150 students from Years 5 to 9 to produce individual ceramic tiles. Groups of students brain-stormed ideas relating to different aspects of the riverlands. One group focused on the surface of the water; the patterns, shapes and objects observed on a moving stream. Another group looked at the river bed; the textures, objects, plants and animals found under the surface. The riverbank was the focus of another group; they explored the tracks, holes, debris, plants, animals and organic shapes found along the river's edge. A fourth group focused on the trees and foliage from the area near the river. The result was not a representational view of a river scene but an intimate study of life in a natural environment; the tracks of a yabby, the ripples on the water, a slithering snake on the windblown sand – a rich, clay tapestry teeming with life, movement, texture and pattern.

Walk on Art *nearing completion.*
Top: Details from Walk on Art

Rose Cameron with the mural , ***Riverland Tapestry,*** *nearly completed*

Visually the work is complex. The detailed tiles in warm terracotta make up the image of a river and trees. The tiles made by so many individuals give the work variation and character offering the viewer many points of interest. Asymmetrical tiles designed by Rose Cameron link together in a flowing composition. Students cut the tiles from templates before applying individual designs and textures. Cameron completed the work by carving two larger panels which have become the central feature of the mural. The relief carvings depict an abundance of birdlife in spectacular detail. Rose Cameron lives and works in Shepparton. She has had a number of successful exhibitions and has recently completed a large community art project in the city of Shepparton for the International Year of the Family.

A second project undertaken by staff and students in 1994 was the construction of an outdoor stage located in a large courtyard in the centre of the school. Many hands and a good deal of enthusiasm were required to complete the basic concrete structure. Local Koori educator and artist, Wally Cooper, was commissioned to design the surface decoration of the stage. Cooper has a strong relationship with the school. His work takes him to many schools in the region promoting tolerance and understanding between people of all cultures. Through his teaching, students have developed a keen appreciation of our indigenous history and culture. The surface of the stage was designed in recognition of the process of aboriginal reconciliation and reflects the indigenous heritage of the area. The work celebrates the coming together of many people with goodwill and with the ancestral spirits of the Yorta Yorta people.

Cooper designed the surface of the stage in traditional dot form by arranging hundreds of handmade ceramic pebbles made by the students. Three clay colours were used: terracotta, manganese and white earthenware. White holds special significance for the Koori people and the pebbles were used to highlight the presence of ancestral spirits. Traditional symbols of the kangaroo, emu, goanna and the tribal totem, the Murray cod, are represented on large terracotta panels. Placed within the design are traditional cooking pits representing the vital elements of fire, water, sun and earth. The centre of the design features the school emblem, the pelican. The students, teachers and parents involved in the project are acknowledged by individual clay hand prints throughout the work.

Sculpture by Imogen Pullar (14), one of the works produced at the Deborah Halpern workshop

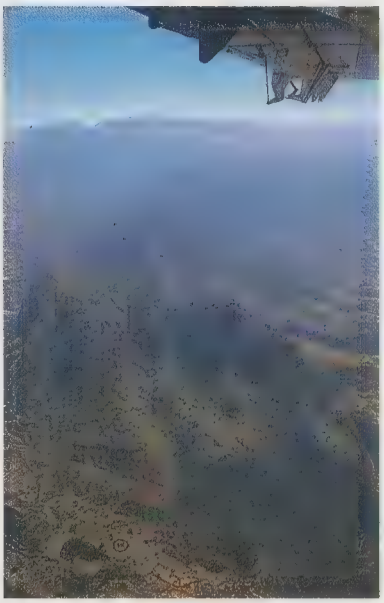
The visual impact of the work is arresting. The earth coloured dot patterns of the ceramic pebbles swirl and flow around the carved symbolic designs creating a unified composition. A vertical border of triangular shaped terracotta tiles decorated by students surrounds the stage and complements the design. The stage has become a focal point for school life and the venue for assemblies, performances and gatherings. Further ceramic art projects continued in 1995 with work being produced by some 150 students in workshops with ceramic artist, Deborah Halpern. Halpern was commissioned to lead the project and she inspired enormous enthusiasm and creative energy as she guided the students in the production of hundreds of brightly coloured cylindrical shapes. The students were encouraged to work in a bold expressive manner by manipulating and adding to the clay. The works were completed by applying brightly coloured slips under a clear earthenware glaze. The works were assembled in a series of totems by the school lake.

The school plans to invite other prominent artists to continue to work with the students and hope, that in time, the school will boast a unique and significant collection of contemporary art. Visitors are welcome to visit the school to view the works.

Angus Cameron is a ceramic artist and an art teacher at Goulburn Valley Grammar School. For further information on these projects please contact Angus Cameron or John Lancaster by phoning 058-218155.

Project Ploughshare in Ethiopia

Geoff Crispin undertook a project to assist the Wolleka Women's Pottery. Here he describes the problems and successes encountered



Flying over the Simian Mountains, Ethiopia

IN 1995, I ACCEPTED A JOB TO WORK IN GONDAR, ETHIOPIA, to work at the Wolleka Womens' Pottery for *Project Ploughshare*. *Project Ploughshare* was started in 1992 as a Christian self-help charity committed to providing aid through the establishment of small scale business enterprises in the Horn of Africa, that will give people dignity and independence as the project becomes self-sufficient. Wolleka Womens' pottery was the first such project and others will follow as funding permits. The job description said, in part :"GC will bear with patience occasional water shortages", reinforcing my image of Ethiopia as dry dusty and famine ridden. While water was in short supply in a Western sense, the images I had of the country proved to be somewhat limited. I will never forget the first flight I took in a small plane from Addis Ababa via Lalibela to Gondar which passed over the Blue Nile gorge for most of the journey – an absolutely stunning experience to see a canyon complex to rival the Grand Canyon in the USA.

These impressions were repeated many times throughout my stay in Ethiopia, in the south in Sidameo, in the rift valley, the Simian mountains, Tikel Dingay and various other landscapes that kept me wide-eyed. The rich cultural history of Ethiopia was also a source of wonder and inspiration, from the ancient culture of the Axumites to the medieval presence in Gondar. The prevailing economic climate in Gondar (population approximately 120,000) is grim. During the war, 20,000 government troops were stationed in the city and when the war ended these troops were unemployed overnight. The effect on the local economy was devastating. During the war, approximately 34,000 Falasha, or black Jews emigrated to Israel en masse. These people, who were the craftspeople of the area around Gondar, were not allowed to own land. To earn a living, they turned to the crafts: pottery, weaving and blacksmithing. When they left so abruptly, the traditional crafts lost their base overnight; pots had to be imported from 200 km away making them expensive.

Charles Sherlock (Director of *Project Ploughshare*), enlisted the help of two well known potters in the UK, Phil Rogers and Peter Beard, to carry out a feasibility study for a pottery. After a visit to Gondar, plans were formulated and funds were raised by various pottery groups, private donors and the Overseas Development Agency in the UK, for capital expenditure and the training program. Initial training for women was commenced in a rented house in Gondar under the supervision of Tesfa Alem and Asselefech Gebremariam in Addis Ababa. Mostly the women taught themselves although two spent time in Addis Ababa receiving training from a commercial pottery run by the Tourist Authority.

The body used for traditional pots is a mixture of two clays – black montmorillonitic clay and a red lateritic clay which are mixed with a calcined and crushed rock called *baha*. The rock is a partially decomposed trachyte that is calcined by burning with wood to stop the clay component of the body cracking in the firing. After calcination, the rock is crushed by hand using a dolly

pot (a steel crankshaft and a piece of steel pipe with one end sealed). By this method, one woman produces 5 kg of 30 mesh grog each day. This is the traditional method used throughout Ethiopia but it became clear that using this process, the women never would be able to earn any more than a subsistence level income. Project Ploughshare located an old laboratory-sized rotating cone crusher in the UK and sent it to Ethiopia to reduce the workload.

After producing the crushed material, the women mix the two clays with this grog to make a thick slip, which is then dried out on a plaster bat, kneaded and formed into pots. The forming method is pinching and squeezing. No coils are used and clay additions are smeared and pressed into place. The pots are burnished using a mixture of slip and vegetable oil, polishing with anything that will create a smooth surface – strings of beads and rings made of hard plastic or stone are used. The production of one week is polished and fired on the same day.

Pots are fired traditionally with animal dung. A layer of dung is placed on the ground in a shallow depression. The pots are laid on top and then covered with more dung. A fire is started with small wood chips and a covering of dry leaves. The firing takes one to two hours and then the pots are removed using a long stick. The pots made in this way are soft and porous and used for storage as well as cooking on an open fire. In addition to functional pots, the women make traditional figurines similar to those made by the Falasha and include animals, birds, priests, women with water pots, etc.

The land in Wolleka (a Falasha village) where the new workshop is situated, was obtained from the Ethiopian Government; a purpose built wattle and daub building with a concrete floor was constructed. The workers had been in this building for three months when I arrived. I was to provide technical help to the potters and assist the management team in developing systems to oversee the pottery's production. Initially, this involved installing a Kilns & Furnaces insulating brick stoneware kiln using two fan forced LP gas burners given to the project. At that time there was no electricity at Wolleka, so the kiln had to be converted to use inspirating burners that relied on gas bottle pressure. This meant that we had to cut four holes in the floor of the kiln to allow the new burners entry. It took three days with hand equipment to cut the 75 mm diameter holes. After that, convincing Shell in Addis Ababa that we should have the gas bottles, having the pipes manufactured and the fittings supplied, burners sent from the UK (one set lost in the post), eventually getting it all set up to fire only to discover that we couldn't get the temperature, all seemed easy. One of the parts supplied had a blocked orifice. When it was drilled out, we started again. By the time I left, the kiln was ready to fire.

Initially, it was important to obtain an overall picture of the economic basis of the pottery and gauge the requirements for additional machinery and training of various personnel. It became clear after about two months that reliance on the sale of traditional pots only would not support the entire workshop: 14 potters and seven management staff including three guards. Pot sales are seasonal with sales non existent during the wet season and for some period after; all local money is invested in seed, ploughing the fields and farming. When harvest commences, local village markets sell pots again. To overcome this seasonality (which also applied to the tourist season) we had to find a product that the potters could make easily, and make money on as well. The product also had to have cultural relevance, that is, be something that the potters would feel comfortable producing. It was decided after much consultation that handmade tiles could be a possibility, not roof or floor tiles but decorative

Top: The festival of the Cross (Mescal) in Gondar.
Above: Demonstrating throwing techniques

Top: Fenta crushing baha.
Above: Genet making a water pot

After 25 tests, the final stoneware throwing body: Mizaba clay, 80#, 50%, Bombawoha kaolin (as supplied) 20%, Brick dust, 80#, 15 % Silica sand, 80#, 15% Shrinkage wet–dry 8%, dry–fired 1300°C 8% Water absorption 7-8%

tiles that could be used in the home or in the many new buildings being constructed in the major cities. Addis Ababa is 800 km away so any product had to withstand the transportation over gravel roads. It was also decided to try and make some domestic stoneware because this could be sold at higher prices in the larger centres to balance the income of the pottery. At the moment, stoneware is imported from Kenya, so any production of this kind would be a useful, if small contributor to reducing demands on foreign exchange. Both the tiles and the stoneware could be made and fired during the wet season whereas the traditional pots needed to be dry before firing or they would crack. It was decided to make the tiles of stoneware clay so that all the new ceramics could use the same glazes and be fired to the same temperature. This would simplify production and clay and glaze making.

The first essential was to locate clays and any other raw material that could be useful. A primary kaolin deposit had been discovered in the south of Ethiopia at Bombawoha some 1500 km away. This material was the result of the degradation of a pegmatite granite with some individual crystals 10 cm in length. Investigations showed that the kaolin contained varying amounts of halloysite which can be a problem in some ceramic bodies. In our case, all we needed was sufficient kaolin in the body to provide high temperature stability. The cost of transporting this material to Gondar is exorbitant (but still less than having to bring from overseas or another African country) so it has to be used at minimum levels. Tests revealed that it behaves as a typical primary kaolin, shrinking 8% wet to dry and 20% overall to 1300°C; the water absorption is approximately 20%. Workability was flabby and unresponsive and it wouldn't hold a bellied shape on the wheel. It fire-cracked and fired off-white in colour at 1300°C.

Although having obtained the primary kaolin, we still needed to add more plastic clays to obtain the right mix of workability and stability. It amuses me to see text books still describing ball clay in the true English manner as if it can only be that way. Experience has shown that ball clays can have the characteristics of one extreme to the other, from primary kaolin to bentonite. Ivan McMeekin's book, *Notes for Potters in Australia*, gives details of suggestions as to why these characteristics develop and the possible locations of super plastic kaolinitic clays. My experience in several places tends to support most of his suggestions about this. Tests on a small number of clays in Ethiopia by X-ray diffraction indicate these characteristics. Eventually we located some clay at Wongamet Wonz, only 60 km from Gondar. It had been described as a ball clay but with drying shrinkage of 16% and a firing shrinkage of 16% at 1300°C there was considerable cracking. When I worked in Jamaica in the 1980s, we had similar clays that consisted of small kaolinite crystals, giving rise to similar montmorillonitic characteristics but without the problem of splitting that the clays in Ethiopia exhibited.

When thrown on the wheel, these Ethiopian clays form a cylinder 25cm high from 700gm but when a bellied form was attempted, the clay would split and shatter completely. Eventually, we investigated several clays in the same area with similar characteristics which were all derived from acid volcanics before being deposited on a large plain on the shore of Lake Tana, several hundred metres below the general altitude in Gondar. The clay from an area called Mizaba seemed to be the best of the group that we tested, with total shrinkage reduced to about 20% at 1300°C. Water absorption at 1300°C was 5%. After being left in a plastic condition for four weeks, there was a improvement in workability indicating that the clay would respond to treatment. I attributed these splitting problems to the fact that the clays were shale-like,

and lacked internal cohesion between the particles and because the water took a long time to penetrate the fine crystals and produce the layer of rigid water essential to the development of plasticity.

There are several possible solutions:

a) Weathering. In Ethiopia it is dry for ten months and rains for two with little moisture in the atmosphere during the dry. Water is at a premium; it is not the best option.

b) Ball milling the clay wet. A ball mill was constructed but this would complicate the clay production process, making it more complex to set up with additional drying facilities needed.

c) Acid treatment to help the clay age giving a similar result to weathering. In Ethiopia it proved to be difficult to obtain hydrochloric acid to run tests, let alone have a regular supply. It seemed wiser to try and rely on something easily obtainable.

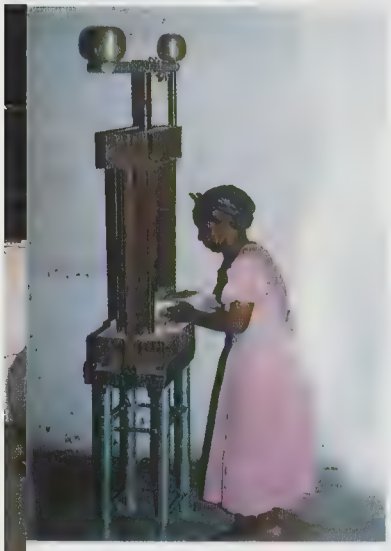
d) Water softener was the option finally chosen with a small addition to the water before adding the crushed and sieved clay to help the water penetration. This might be seen as a contradiction but it reduced the splitting and enabled the mix to be used to make a limited range of domestic ware on the wheel.

Both clays used in the body recipes are quite refractory. This is similar to Australian ball clays and also those I experienced in Jamaica where the alkali content is usually quite low. A flux has to be used to reduce the porosity down to acceptable levels, below 10% for the domestic ware and less than 15% for the tiles. The geology of the area around Gondar consists of a massive sheet of basalt several hundred meters thick with occasionally deposits of acid volcanics. Several of these were investigated and one tuff deposit that Phil Rogers and Peter Beard identified proved to have sufficient alkali to be useful as a flux (*see table for chemical analysis*). It was investigated originally because it was described as a white clay. The problem with this material was that it contained approximately 15% of a montmorillonitic clay mineral and created problems of excessive shrinkage, cracking, warping and difficulties with throwing. Montmorrillonitic clays tend to give suddenly rather than flow as kaolinitic clays do and you end up with a series of clay 'chips' in your hand instead of a steady build up of slip. Michael Cardew had many problems attempting to use similar clays in West Africa.

The problem was resolved by using reject house bricks that were based on this tuff. (Essentially we are using a calcined clay because the bricks are fired to about 900°C.) This removes the problems associated with the clay minerals, while still being able to take advantage of the flux content (*see table for chemical analysis*). The iron oxide level doubled compared with the tuff due to contamination of the material by basalt, but as the firing process for the pottery is oxidation, the higher iron content is not a problem. The bricks are quite soft and easily crushed and are supplied at a low cost. The other non plastic used is silica sand from the Ethiopian Glass company in Addis Ababa. They remove the fines from the sand they use to make glass, and this proved ideal because at 80 mesh, it only requires sieving to remove the small amount of oversize.

The whole process of finding an acceptable solution using only Ethiopian materials took nearly six months trying many different clays and combinations to achieve an acceptable result from both an economic and workability point of view. The Wongamet Wonz clays were tested with less of the clay being used to try to reduce shrinkages but this required more silica sand or kaolin both of which would increase the cost of the clay body beyond what was economically feasible. In Jamaica we were able to reduce the clay content to overcome the excessive plasticity of the available clays.

Top: Firing the pots with animal dung. Centre: Ball clay tests. Above: Malaku calcining gypsum



Top: Almas making stoneware.
Above: Sewhnut using the tile press.

Tile Mix:
Brick dust 80# 25%
Silica sand 80# 25%
Mizaba clay, 80# 30%
Bombawoha Kaolin, (as supplied) 20%
Shrinkage wet–dry 7%, dry–fired 1300°C 7%,
Water absorption 11–12%

When the clay bodies were resolved, glazes had to be developed. At this stage I was running out of time so a preliminary range of glazes were suggested and tested. Most materials to make stoneware glazes are available in Ethiopia. We tested a tenmoku based on basalt, a white glaze based on felspar and talc from Kenticha in southern Ethiopia, a clear glaze based on crushed glass and felspar, and a glaze based on the uncalcined tuff. The glazes need further developmental work based on what is available in Ethiopia.

Plaster was required to make the moulds for the tiles but it proved a problem obtaining material of consistent quality. Jeyco is the local name used for plaster for whitewashing walls of buildings as well as the material used for more structural applications. The crushed gypsum from the hardware store was unsatisfactory. The simple calcination process to improve the plaster quality involves heating the crushed gypsum to approximately 150–160°C. This drives off the water of crystallisation giving a weight loss of 20%. We tried our version of a calcination process by heating the gypsum in part of a 200 litre drum over an open fire. Constant stirring was required to drive off the water. This made a considerable improvement to the quality of the moulds but to get the repetition of the relief detail we needed to slow the setting time of the plaster. This was achieved by using 7 gm of gelatine dissolved in boiling water to make up 20 litres and soaked overnight. The plaster kept liquid for about four to five minutes, time enough to take up the detail from the master moulds before it set.

The cone crusher had to be installed, but as the electricity had not been connected during the time I was in Ethiopia it was installed in a shed in Gondar. This mill was able to crush enough rock for the clay for the traditional pots. All the glaze tests were carried out with materials that had been crushed using the mortar and pestle, then sieved. The processing is guaranteed to generate a few blisters.

To make the stoneware clay, we needed a ball mill. This was built in Addis Ababa to the design in the Harry Davis book: *The Potters Alternative*. We used a rubber lining to increase the internal size and reduce the noise level. The grinding medium is basalt pebbles because quartz pebbles are not available locally. Quartz pebbles have been located in the province of Tigrey and will be obtained. The mill is capable of grinding approximately 80–100 kg of dry material per batch, depending on the hardness and mesh size required. We grind the glaze materials to 120 mesh.

A screw press was also built in Addis Ababa, again from the design in *The Potters Alternative*. It took several months to have the machinery built and transported to Gondar but when finally received and installed, it worked well. The pressed tiles have a sharper definition of detail compared with the handmade tiles.

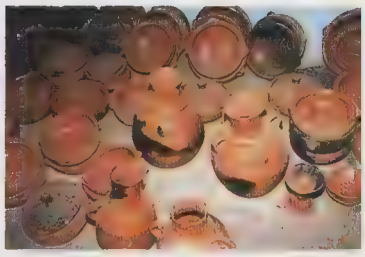
The policy of the project is to spend money in Ethiopia wherever possible, but an exception was made to buy a pug mill in Australia with the help of Geoff Hill from Venco in Perth.

Six foot-operated pottery wheels were donated to the project from a discontinued project with the Falasha people. Three of the women, Almas, Thopia and Tegist, had received some training and a program has commenced to teach all the women to use the wheels. I taught the more experienced women production throwing techniques and they, in turn, taught the other women. This proved to be successful and all the women are now capable of using the wheel in addition to their traditional hand building skills. The potters also use the tile press so that they can make whatever will give them the best financial return over the whole year.

CHEMICAL ANALYSIS OF ETHIOPIAN MATERIALS

	1	2	3	4	5	6
SiO_2		58.3	59.1	42.8	53.40	45.0
Al_2O_3	18.9	17.8	19.4	14.3	26.40	38.0
Fe_2O_3	0.07	3.0	9.4	17.0	4.63	1.3
CaO	0.2	1.2	2.6	6.41	0.65	0.07
MgO	0.2	0.9	1.1	5.16	0.46	0.1
MnO_2		0.1	0.2	0.27	0.09	
Na_2O	1.2	3.1	3.8	3.53	0.16	0.05
K_2O	12.8	6.1	3.8	1.58	0.13	0.45
TiO_2	0.01	1.1		3.69	2.86	0.08
P_2O_5	0.2		0.2	1.25	0.08	
BaO	0.01		0.1	0.06	0.03	
Rb_2O	0.88					
ZnO			0.01	0.03	0.02	
ZrO_2			0.08	0.08	0.12	
L.O.I.	0.55	7.4	.0.22	3.17	10.80	14.7
TOTAL	99.76	99.2	99.01	99.34	99.84	99.75

1. Kenticha Feldspar
2. Ancho Michael Tuff
3. Ancho Brick Dust
4. Wolleka Basalt
5. Mizaba Clay No. 4
6. Bombawoha Kaolin



Top: Traditional cooking and storage pots.
Above: Stoneware tile with chicken (doro) design

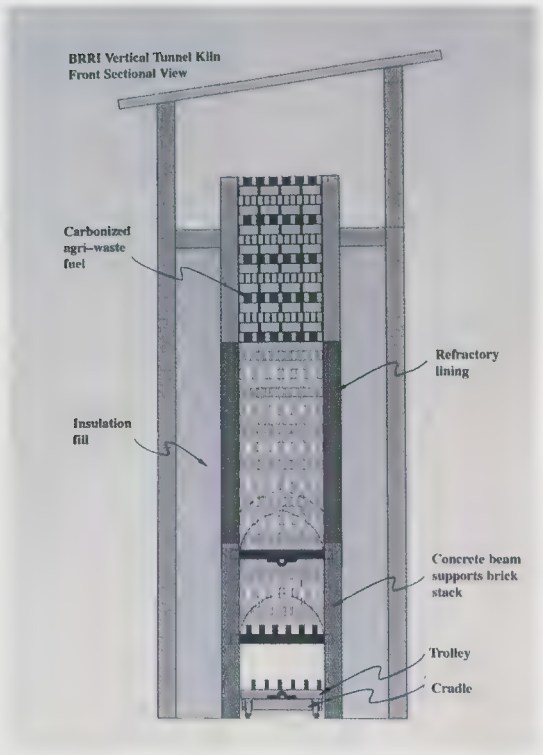
One of the most difficult tasks was to find a manager with the technical skills required to oversee both the materials and the production in the pottery. People with management skills are in high demand in Ethiopia and Gondar was not seen to be the most desirable place to build a career. We limited ourselves to finding a local person who would want to remain with the project for a period of time. Eventually, Tasfaye Tufa was employed and he had six weeks to learn. I returned to Wolleka for a further two months to assist with the production start up.

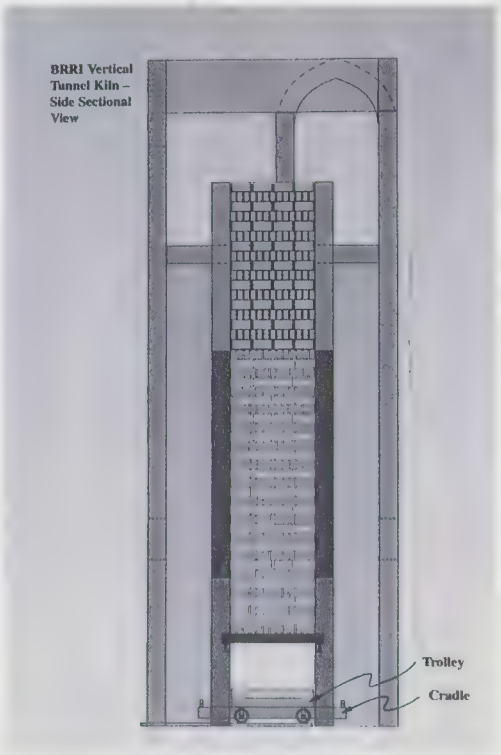
It is intended to start training additional potters, and possibly using them to establish other potteries in several centres in Ethiopia. Already the pottery has had enquiries about export of their products to Europe and this will be feasible as the project gains momentum. Markets are anticipated to be local, tourist (both traditional pots and stoneware), cities (stoneware) and export (which could be the stoneware as well as some of the traditional pots). The prospects for the pottery are positive. Skills are improving and the necessary raw materials are being located and tested. Markets are being identified and the women will be able to make a reasonable living in local terms and support their families and confidently establish their economic independence.

Geoff Crispin is a potter from Whiteman Creek, NSW. He has asked potters to donate work to be raffled at the National Ceramics Conference in Canberra, ACT, in July, 1996. All proceeds will be used to assist with the Project at Wolleka. Anyone interested in this project should contact him at tel: +61 (0)66 449685 or fax: +61 (0)66 431717.

A Ceramic Safari in East Africa

Reid Harvey reports on his work in Sudan and Kenya where he is advocating appropriate technology





Above: Sectional views of the vertical tunnel kiln. Opposite page: The half-built, vertical tunnel kiln of the Building and Road Research Institute of Khartoum University. December, 1995.

IN SWAHILI, THE LINGUA FRANCA OF EAST AFRICA, the word 'safari' means journey. For the past two years I have been on a safari with East African ceramists: an adventure in technology transfer. The journey started with a year in the Sudan, working with a *Women in Development (WID) Project* for the United Nations. It has continued with ceramists in Kenya. Several side trips to Ethiopia, Uganda and Eritrea led to ceramic opportunities and environmental issues. As the journey started, it was 47°C in the shade, a hot dry wind burned, stirring up a dust storm, called a 'haboob' in Arabic. More than once we saw bright daylight plunged into utter darkness by these haboobs. Sudan's dry season lasts 10 months without a drop of rain. With the desert here advancing at the rate of seven kilometres per year, one wonders if ceramics is viable. Enter technology transfer.

When first arriving in western Sudan, I noticed near our vocational school in El Obeid, a number of wood burning clamp kilns. But our WID project aimed at training women for extra income generation in various ceramic techniques, starting with hand building tableware. Unfortunately, lack of resources and support cut this project short. My 26 students worked for four months and acquired basic ceramic skills, but it is doubtful that any of these daughters of the desert had been able to pick up the design and marketing skills needed to continue working.

On the outskirts of Khartoum, 600 million bricks are produced annually. As in much of Africa, building materials are in short supply and will be produced at any environmental cost. In an insidious crisis, countless bricks are being poorly formed, then under-fired in inefficient wood burning clamp kilns. These poor quality bricks are produced not only around Khartoum but throughout Sudan and Africa.

It was hard for me to concentrate when talking to brick makers and builders. I wanted to suggest: Try adobe, try stabilised earth blocks. But habits die hard. Consumers with a little money want their bricks fired. Formed with soft mud, they quickly lose their shape and because of this, they cannot be properly stacked in the kiln and must be piled close together. Heating is by conduction, not convection, resulting in the bricks being nearly raw. Often, when driving home, I would deliberately run over bricks that had dropped from a transport truck on to the road. My curiosity as to quality always got the same answer: the bricks would crumble to dust.

I felt that the public deserved a stronger, longer lasting product. The most appropriate solution was to provide an energy-efficient kiln and teach workers how to make a better brick. Working with Khartoum University's Building and Road Research Institute (BRRI), I adapted and built an Asian vertical tunnel kiln. The BRRI's kiln will fire the bricks made on the production line of the brick plant which they own and operate. The fuel will be carbonised agricultural-waste and is made in a similar way that charcoal is prepared from wood but, importantly, it is made from cotton stalks, sunflower stalks or bagasse. These carbonised fuels, reduced to a granular size, are dispersed among the bricks when loading the kiln from the top. Every hour the brick is lowered by one batch, using a chain pulley system.

The vertical tunnel kiln is energy efficient because incoming bricks at the top of the kiln are preheated using the waste heat of its central firing zone. Secondly, the brick stack is well insulated. This system has been a success in Asia for more than 20 years. By comparison, other types of brick kilns – the clamp, Hoffman and bull's trench kilns – waste energy in preheating both their brick and their outer insulation. Hoffman kilns are massive – looking down from the top, the firing follows a circuit around the kiln's oval shape. Clamp kilns are just a pile of bricks with an opening underneath for the fuel. Often the clamp has no permanent walls – mud is dabbed all around to help prevent leaks. The bull's trench is a hole in the ground in which fuel and brick are stacked then fired. Designed to yield a batch of 180 bricks every hour, the vertical tunnel kiln will produce nearly 1.5 million bricks annually. It is fired continuously for 11 months of the year, allowing for a month of maintenance. When production greater than 1.5 million is needed, more kilns can be built. The total cost of the BRRI's vertical tunnel kiln is about US$3000. Ironically, this cost is so low that many aid donors will not consider funding it, nor will many banks lend money.

Sudan's number one export is cotton. It also grows sunflowers for producing oil. The stalks of both cotton and sunflowers usually go to waste. Bagasse is a by-product of sugar cane, mixed with molasses. South of Khartoum, a carbonised bagasse is being manufactured. Another important attribute of the vertical tunnel kiln is that it is well suited to small scale production, requiring only three or four workers at any time to operate. Along with its obvious environmental advantages, this kiln complies with the need to start industry on the smallest scale. For the BRRI's kiln, a second educational phase would aim to improve the skills of traditional brick makers, training and encouraging them to build their own vertical tunnel kilns. This project proposal has been endorsed by the Khartoum office of the United Nations Industrial Development Organisation

Top: Atop the Hoffman brick kiln at Khorobhagarat, Sudan. Egyptian technicians at left and centre talk to their Sudanese counterparts. The kiln's heat helps the heavy fuel oil in the containers to become less viscous. Above: The Hoffman kiln at Khorobhagarat, Sudan. Because this kiln fires heavy fuel oil, the wood previously burned in the clamp kilns of this arid region will be conserved.

(UNIDO), and is waiting approval by UNIDO headquarters in Austria. On a widespread, international scale, UNIDO has been the only organisation to support ceramic industrial projects. However, several Non-Government Organisations (NGOs) such as the German development group, GTZ, and the British based Intermediate Technology Development Group (ITDG), have also been active. These groups have executed several successful ceramic-related projects, primarily in the production of building materials. When the BRRI's newly designed vertical tunnel brick kiln begins functioning, it may well be the first of its kind on the African continent. It may also be the first anywhere to fire carbonised agricultural waste. In Asia, these kilns fire bituminous coal fines. Adapting to carbonised agri-waste offers a design that is appropriate and more sustainable in Africa.

The best I was able to do in the Sudan, besides adapting the vertical tunnel kiln, was to document what ceramists there are doing and the ways in which their products are essential in the everyday lives of the Sudanese. Ceramic ziers (water containers) are universally used to store water. Ziers are scattered around towns just like public drinking fountains, so necessary in the burning, dry climate. There is a generous custom in the Sudan, in which civic-minded individuals will donate and maintain ziers for the community and for any passersby. Low fire ceramics range from ziers to cooking pots as well as drums made by stretching animal skins over a ceramic base. In the absence of other entertainment, my family would often spend an evening drumming, pretending our rhythm and ceremony were as sophisticated as that of the Sudanese. In another custom, Sudanese drink coffee brewed in the traditional low fire gebana. The gebana resembles a sphere with a small cylindrical spout pointed 45 degrees out and upward. As with the zier, the gebana has a rounded bottom and is sometimes placed in the sand. But it normally rests in a cloth or beaded ring, a match in design to the coffee pot's incised decoration.

For the everyday ceramics of Sudan, whole communities are typically given over to production. Ziers, for example, are made in Dajo, near El Obeid, by women using a red clay with an addition of millet husks and mica. Often the clay is plastic, sun-parched mud, skimmed from the top of dried up water holes. Products including the gebana, drums, cook pots, and ziers are fired on

At the Khorobhagarat kiln, a brick making team at work. These soft mud bricks quickly lose their shape.

a bonfire by the men of the community. From a scholar's perspective, Sudan is of interest to both the ceramic artist and the scientist. In Khartoum, the Sudan University Ceramic Department has offered a classical approach to art instruction for 40 years. The graphic and three-dimensional skills of the students are impressive. However, basic ceramic materials are lacking; glazes are expensive and usually imported from Egypt. Individual artists must have clay materials trucked in from several hours away. And the public has not been adequately sensitised to the high quality of local ceramic work produced, preferring instead mass produced imported ware.

The work of the department head at Sudan University, Professor Salih El Zakir, has adhered to a meticulously executed Arabic style. One quite successful alumnus is Yasir Mohammed. Yasir's elaborately formed pieces are most often unglazed. Large sculptural vessels are slipcast, with a clay body having no deflocculent. The plaster used for moulds is of a low quality typical in much of Africa but the addition of 4% portland cement helps to give the moulds strength.

Across the White Nile from Khartoum, in neighbouring Omdurman, another ceramic devotee is Dr Ahmed Hassan Hood. To financially diversify his business making refractory brick, Dr Hood produces a line of decorative planters and small ziers. As is often the case in Africa, where shared information can be hard to come by, the artist must attempt to be a scientist, and vice versa. Dr Hood is a chemical engineer turned ceramist. Remarkably, with no prior experience other than research in books, he has begun production of good quality kaolin firebrick fired to 1400°C. Dr. Hood's oil burning, domed brick kiln was built through trial and error, and patience. His own ceramic journey has been one of pure scientific inquiry: an acquired understanding of what the local materials can do.

Near El Obeid, at Khorobhagarat, the construction of a Hoffman kiln is a new project of the United Nations Development Program (UNDP). Firing with heavy fuel oil, an express objective for this kiln is to reduce the amount of wood fuel used for brick making in the area. I gave brick forming teams at the kiln some assistance in using a drier mix of clay. With this improvement, the kiln's managers were able to achieve improved stacking in the kiln, resulting in better firing, stronger bricks and reduced fuel consumption.

Top: Taking a break while carrying water ziers the 15 kilometres from Dajo to El Obeid market. Above: Fatimah Hassan with an earthenware duck. The Vocational Center at El Obeid, Sudan.

Because success in marketing is closely dependent on good technical skills, in 1992 in the US, I founded Appropriate Technology Transfer in Ceramics (ATTIC). My aim was to provide services and technical information to aspiring ceramists. We distributed two do-it-yourself manuals. I wrote one on making models and moulds and another on how to build and operate an inexpensive air-release ceramic press. We also made available 25 out-of-print technical papers which give the basics on various ceramic processes and materials. ATTIC flourished assisting ceramists from the US and many other countries, proving that what is appropriate is needed everywhere and is forever relevant. Appropriate technology is not only applicable to remote villages in the heart of Africa.

A similar body of information exists in back copies of *The American Ceramic Society Bulletin*, also from the 1930s to the '60s but the demand has not warranted reprinting. Only more recent information, primarily on advanced ceramics, is being rendered to electronic libraries. In the 1970s, my initial pursuit of ceramic information started in Liberia, West Africa. There I worked for 11 years in glass art and I dabbled in ceramics. I began to notice that Liberia and neighbouring countries appeared stuck in a cycle of raw materials exportation and finished goods importation. For export they could mine iron, cut timber and tap rubber, but they manufactured little. In Liberia, I walked every day on a path of kaolin, yet I had to import firebricks for our kiln. Although Liberians and their neighbours were melting and casting iron and other metals in the 19th century, it seems that the metal products imported from Europe and the US supplanted local products. The metal-working industries closed and craft traditions were lost. When I saw this, I decided glass art was too ornamental for me and I could work in ceramics to change these situations for the better.

I enrolled at The New York State College of Ceramics at Alfred University. Among the more important projects I undertook there was to build a scove kiln with the help of a small group of people who formed Volunteers in Technical Assistance (VITA). This scove kiln is built of the same bricks that it is firing. (Scoving is the mud on the outside of the kiln.) These simple kilns are built all over Africa with the biggest investment being time and labour. First, clay is dug and formed into bricks. These are dried and stacked en masse, a finger's width apart. A slow wood fire is started underneath and in due course (days later) the kiln is dismantled, the bricks ready to use. But our brick and kiln at Alfred differed from those in Africa in one important respect: we had mixed creek sand by foot into our red clay to make it refractory. We had taken a first journey into an uncharted region of appropriate technology with little prior information as to methodology. Our premise for the scove kiln project was that we were making simple refractory brick and that villagers almost anywhere in the developing world could do the same. Without much financial outlay, villagers could then build ware kilns with the bricks for the production of a variety of ceramic building materials, other refractories, table and sanitary ware. In a second phase, a foundry could make carpentry or farm tools, curtailing costly procurement of imported implements. For water and sanitation, they could make ceramic water filters, pipes and tiles for drainage or simple sanitary wares. For agriculture, kilns can be built to burn lime. Glazed food storage containers would help preserve food until it reaches the market. With all these various sectors in need of simple, inexpensive solutions on a village level, clear opportunities in appropriate, small business developments are wide open. So the journey leads to an inevitable conclusion: the only true guarantee of self-sustainability is, I believe, to be found in ceramics,

Stalls for foot-mixing brick materials will soon be replaced by a mechanised mixer. This will help make possible the drier mix needed for uniform bricks and proper stacking, resulting in better bricks and reduced fuel consumption.

the starting point of nearly all industry. Training and education in ceramics and in high temperature processes are the prerequisite to start. It is the manufacturers' products, like refractory bricks or carpenters' tools, that make so much industry possible. A consumer product, like a vegetable or an article of clothing, plays no further role in developing industry.

The people of developing countries are industrious and resourceful, using constructively what many from the richer countries would regard as waste: tyres turned into sandals, discarded coffee cans turned into lanterns, a scrap of paper turned into a bag.

My ceramic safari continued through Ethiopia to Uganda and from there I went to Kenya to work with their Ministry of Commerce, Department of Industry. The legions of tourists that come to Kenya are here to see the wildlife, however, not ceramics. But there is adventure in technology transfer that leads into uncharted areas where appropriate technology in the high temperature processes must be tried, adequately researched and documented. Further areas that need appropriate research include: development of appropriate mould materials as alternatives to plaster-of-paris for casting and pressing; identification and winning of minerals on a micro-scale; development of an appropriate glazed food storage container; and an effective low-cost water filter. While having done work in each of these areas, I am also developing appropriate electric test kilns and their refractories and appropriate crucibles for high temperature processes. All these must be made using available resources because Western-style supplies are rarely available. There is some literature available on this subject and what first comes to mind is Cardew's classic, *Pioneer Pottery,* based on his own ceramic journey in Nigeria. But a more recent and comprehensive approach to ceramic education and training can be found in a four-volume set of books: *The Self Reliant Potters Series*, by Henrik Norsker and James Danisch and published by GATE, the German Appropriate Technology Exchange. This series offers the only information of its kind on simplified, appropriate technology of ceramics. Its volumes include: *Clay Materials, Refractories* and *Kilns, Glazes, and Forming Processes*. But with respect, Norsker and Danisch's invaluable contribution is only the tip of the iceberg. Each section of each of the four books suggests volumes of additional research.

Another set of books is the series: *Build Your Own Metal Working Shop from Scrap*, by David Gingery, published in the US by Lindsay Publications. The seven volumes in this series start with a book called: *Build a Charcoal Foundry.* The second book in the series is called: *Build a Metal Lathe*. Again, using scrap

Fuel Consumption for Brick Kilns in Africa and Asia. Much of the data shown is cited in Technical Development Brief 1, Appropriate Development Consultants, Bowness-on-Windermere, UK.

KILN TYPE	FUELS	KJ/KG OF FIRED BRICK
Vertical Tunnel	bituminous coal fines	915 to 1130
Vertical Tunnel	Carbonised agri-waste	*
Hoffman	Fuel oil, coffee hulls, etc	1600 to 2400
Hoffman	Bituminous coal	1650 to 2200
Clamp	Wood	2600 to 3000
Bulls Trench	Coal, wood, waste oil	2820

*Statistics for Sudan's vertical tunnel are not yet available; however, carbonised agri-waste has a calorific value similar to that of the poor quality bituminous coal fines used in Asia.

Low-fire ceramic drums, Dajo, Sudan.

metal, the cast parts needed for the lathe can be made with the help of the charcoal foundry already built. Gingery's subsequent books tell how to make a drill press, a shaper, a milling machine and all the other accessories needed in a complete metal fabrication shop. All these machines can be made using parts turned on the lathe. The cost of the entire metal fabrication shop is negligible. Through Gingery's books and those of Norsker and Danisch, the means of industrialisation through ceramics and metal are adequately proven. One other book on appropriate technology makes the case for small projects. This is the Schumacher classic: *Small is Beautiful*. This book stresses developing skills and traditions in various crafts and underlines the problems with large scale industries.

The history of failure of large projects is understood. A brick plant requires electricity for blowers but can get none. A vocational school in the desert has massive machines but neither teachers nor students. But there still exists an impetus to create and fund these white elephants. The allure of a quick fix is irresistible, and the subsequent news of failure is easily squelched. There is a lack of commitment by donors, contractors and beneficiaries, starting with a feeling that no one really owns the project.

So what can we do? If you want to help bring ceramics and micro-enterprise to developing countries, start by telling people that teapots are beautiful, but there is a whole lot more to ceramics. Inform donors and politicians just how vital ceramics is in the development process. Tell them that education and training are the only key inputs and that in developing countries, all other resources are locally available. Let them know that ceramic manufacturers' products make possible a wide variety of other micro-scale industries and that your country's development assistance should be applied to such projects. Get together with other ceramists you know and find ways of assisting ceramists in developing countries.

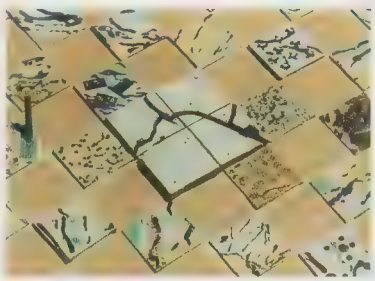
The goal of this safari is to give individuals a decent and productive livelihood through micro-enterprise and help them to stem environmental degradation at the same time.

Reid Harvey lives with his family in Nairobi, Kenya, where he works as a ceramic design consultant. His experiences in Ethiopia, Uganda and Kenya will be the subject of a further article in *CeramicsTECHNICAL*. Questions or comments can be addressed to him by e-mail at: <attic@arcc.or.ke> or <atticeram@aol.com>.

Second International Ceramics Biennale, Beer Sheva, 1995

A report on this event by Magdalena Hefetz

DURING THE SECOND INTERNATIONAL CERAMICS BIENNALE, Beer Sheva, 1995, we remained faithful to the concept which guided both the symposium, *Art and Industry: the Artist in the Factory*, (1990) and the *First International Ceramics Biennale* (1993), dedicated to the same subject. Once again we attempted to create an encounter between the artist and industry, the fruits of which become part of the urban landscape. This time though, we decided to include the municipality in the project. The encounter between the artist, the industry, and the city brought about the idea for the Biennale – ceramic facades for public buildings and ceramic sculptures for the city landscape. We sought to put the artists in factories so they, in turn, create ceramic art (ceramics can be found in abundance in the Negev both as raw material and as industrial products) and a natural component of local urban construction. Following five and a half weeks of work in the various ceramics factories of the Negev, nine ceramic walls and two three-dimensional pieces were erected throughout the city of Beer Sheva.



Niels Huang from Denmark designed a wall for the city's Ministry of Education Building (14.8m wide x 2.6m high). In this project, Huang realised his guiding principle: wherever he works he uses castings taken from the natural surroundings. He made plaster castings in the Northern Negev, Mediterranean Sea and Dead Sea areas. These castings comprise a three part composition in which are integrated tiles, some prepared by him and some ready made by Negev Ceramics. On the various plates he combined, after firing, various found objects – ropes, metal wires, electrical parts, and more. The entire wall is touched with the magic of the '50s – a style which is once again in fashion.

Shlomit Bauman from Tel Aviv was able to utilise all of the advantages of the ceramic plant. She created a three sided pyramid which presents a textural map of the Negev on printed tiles (9m base x 6m high). The pyramid, whose point, when approached from the city, faces south, and which is situated at the Southern exit of the city near the Bedouin market, is rich with symbols: the Bedouin tent, the Egyptian pyramids, the tents of the first Jewish settlers in the Negev, etc. When looked at upside down, one finds an exact map of the Negev – surrounded by three bodies of water – the Mediterranean Sea, the Red Sea, and the Dead Sea. Upon the inner surfaces, Bauman sprinkled local historical and cultural symbols. She used 38 screens in total in order to print the many motifs which form this magical pyramid.

Robert Sedestrom from the USA designed the wall of the Public Library Building (5.6m wide x 2.4m high). Following many experiments with textures and glazes, Sedestrom created a quilt-like structure from tiles measuring 20cm x 30cm each – a repetitive motif of squares measuring 50cm x 50cm each, in the hollow centres of which he laid small terracotta stones. The wall goes so well with the building it looks as though it was built along with it. Sedestrom was the first artist to finish constructing his wall, which gave him time to continue experimenting and to enjoy his visit in other ways as well.

Klaus Schultze from Germany, together with Haim Tedgy from Ofakim, created a sculpture (4m x 4m x 3m high) situated next to the City Hall Building. Using iron armature and wire netting, they built the body parts of two giant figures from the different shaped blocks produced at the factory. The figures were prepared at the factory and then transported to the site in stages using two forklifts and a crane. Schultze, known for his giant urban sculptures, created an impressive sculpture of the 'Beer Sheva Couple.' From day to day we could see how the figures developed. Klaus and Haim quarried stone, mixed concrete, built and constructed, piece by piece. The woman's skirt is a mosaic of broken tiles discarded from the works of the other participants – a colourful celebration. We worked up to the last minute in putting together the sculpture, and kept our sense of good humour.

Ruth Horam from Jerusalem designed the wall of the Chess Club and Symphony Building (6.3m wide x 3.8m high). Horam is a painter, which may be the reason why she encountered so many technical difficulties. Given that the wall was built with no plan or pre-made sketch, and because of rain and wind, it was installed behind great plastic sheets, the creation eventually exposed before our eyes was a surprise: a colourful, floral, jolly composition, framed in blue tiles with white stains like snow flakes. This almost impossible combination has a fairy-tale effect giving liveliness to the overwhelmingly grey surrounding area.

Helena Samohelova from the Czech Republic designed a corner wall for the Beer Sheva Theatre (10m wide x 2.6m high). Those who are familiar with her work on the walls of the underground railway and other public structures in Prague would easily identify her modular style on this wall as well. She prepared moulds according to models which she brought with her and promptly created 800 tiles which she coated with a soft white glaze. The entire wall creates the elegant and playful effect of light and shadow.

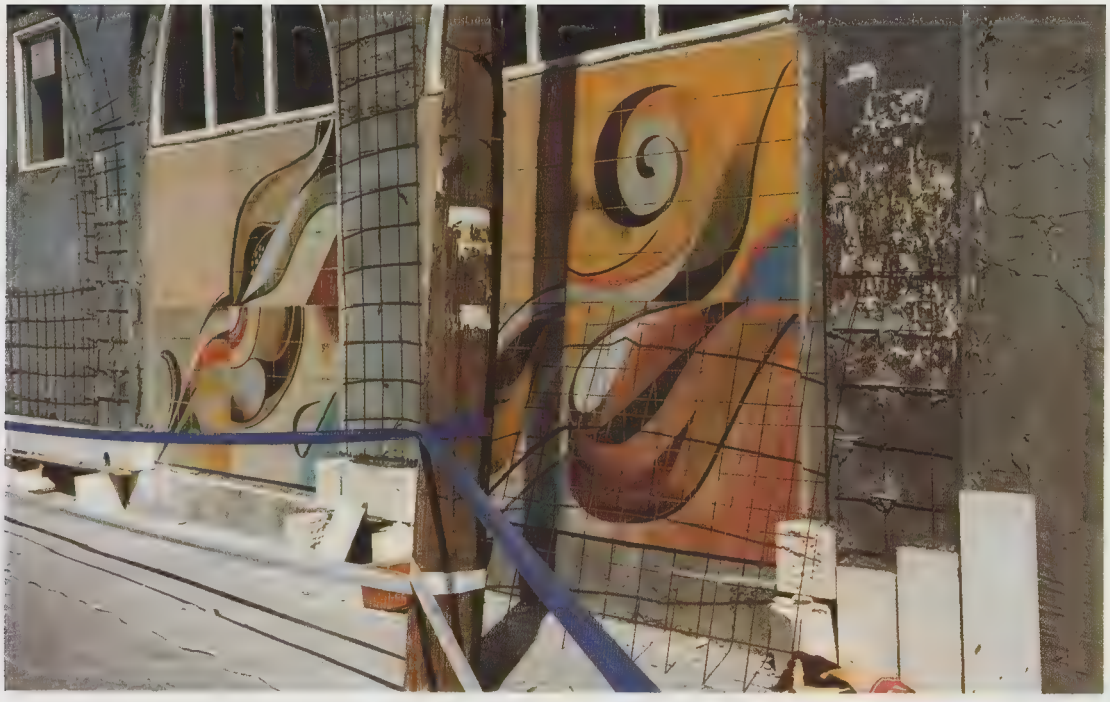
These works of art were created by twelve artists – five Israeli and seven from other countries and stand today as 11 spectacular creations in various styles and sizes and add a special edge to the city landscape.

Both the Biennale Association and the Municipality of Beer Sheva participated in the preparation for the Biennale. A year and a half before the event took place, we began searching for the right buildings on which to place the ceramic walls. We approached several artists and requested that they submit plans and sketches. Finding the appropriate locations and matching those with the various sketches was a trying and difficult task. We had to obtain the approval of various bodies – tenants, architects, the Municipality – and to weigh many technical considerations all of which made the decision-making process a difficult one.

The ceramics factories, whom we recruited as partners during the first biennale and other prior events, have come to recognise the advantages such collaboration offers them. All of the factories responded positively to our initiative and their cooperation with the project certainly surpassed our expectations.

Four plants hosted the artists: Harsa in Beer Sheva which produces sanitary ceramics, Negev Ceramics in Yeruham which produces floor and wall tiles, Terra Cotta Ofakim in Ofakim which produces architectural elements and roof tiles, and Zahavital in Ofakim which produces wall tiles. Hasin Esh in Beer Sheva, which produces roof tiles and clay, did not host artists this time due to general remodelling, but did donate four tons of raw material.

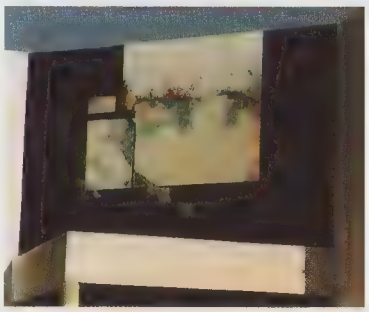
The artists were assigned to plants according to the specifications and needs of their respective works. Ilana Aviv from Herzliya built a wall for the Faculty Restaurant Building at Ben Gurion University in the Negev (3m wide x 6m high). She used a technique of sand casting which enabled the creation of unique special effects. Tamar Shachar from Beer Sheva prepared a ceramic wall for the Soroka Medical Center. Using materials from Harsa, she designed a wall which acts as an enormous and colourful piece of oriental jewellery dazzling to the eye. Florence Weisz (USA) coated the western fence of the Yad Lebanim Building with colourful tiles, arranged in squares according to the colours of the rainbow. These were framed by different shades of grey tiles and the whole work measured 56m wide x 1.5m high.



Above and right: Peter Jedlic'ka from the Czech Republic built a wall for the Greenberg Supermarket Building. He worked in a studio which was provided for him at Negev Ceramics and experimented with colours and glazes until he found the effect he was looking for. The result – eight large pictures measuring 2.7m x 2.1m each which depict motifs from the plant world. The building, which previously looked like a bunker, underwent a metamorphosis. The building is presently being remodelled – its remaining walls are being laid with stones. Overlooking the old city, the facade of this building has become the jewel of the neighbourhood.

As with previous events, we had both budgetary and organisational problems. At times, it seemed as though we would be unable to overcome all the difficulties. The holding of the Biennale despite these difficulties is due to the intervention of Eli Boker, head of the Economic Company for the Development of Beer Sheva. The assistance which he gave us, the cooperation of the ceramic factories, the enthusiasm and workmanship of the artists, and the help of many others, all contributed to the success of the enterprise, for which we are grateful.

I am pleased with all of the creations. We have bestowed Beer Sheva with wonderful works of art and, simultaneously, were able to call public attention to the under-realised potential of ceramics in architecture and building. The Biennale has established a name for itself and will continue to make waves. I see before me great possibilities for collaborative work with urban planners, architects and factories. With the help of the artists, ceramics may burst forth from the realm of decoration and become a building material once again.



Above: Luciana Schiazza from Italy designed the wall at the Technological College (9m wide x 7m high). She painted the tiles in pastels and surrounded it with a wide frame of dark blue tiles. She overcame many difficulties with professionalism, and utilised all of the advantages which the factory offered.

Magdalena Hefetz is a ceramic artist from Jerusalem, Israel. She works on commissions and has been actively involved as artistic director in organising the Beer-Sheva Biennales. Photography by Magdalena Hefetz.

Hida Takayama Ceramic Workshop

Hitoshi Morishita reports on this regularly held workshop in Japan

Birds eye view of the Hida International School of Craft and Design

THE FIRST HIDA TAKAYAMA CERAMIC WORKSHOP was held in 1993 to commemorate the 10th anniversary of Hida Takayama Japan-Australia Society and Hida Takayama Japan-New Zealand Society.

There were many reasons for holding the workshop in Takayama, including the cooperation of Ms Aimée McLeod, a ceramist who lives in Tokyo, the facilities at Hida Takayama International School of Craft and Design and the interest of the people in Takayama towards ceramics. Takayama is a famous place for ceramics, with the known styles of Shibukusa, Koito and Yamada.

Takayama is in the centre of the largest island, Honshu, in Japan and surrounded by mountains higher than 3000 metres. At the beginning of the Edo Period (17th century), people made great progress in building their town by using the rich resources of local wood. The culture brought from Edo (Tokyo) and Kyoto has remained here in Takayama and has been adapted to form as its own culture. By the year 1970, there was a resurgence of interest in old things, and Takayama has become a city of tourists with two million people visiting every year. In organising the ceramic workshop, we sent invitation cards to Australian and New Zealand universities and many universities in Japan and also to those people distinctly related to ceramics in order to attract participants. The participants in the first workshop were three from New Zealand and four from Japan. The one-week workshop of participants from these two countries with different historical and cultural backgrounds proved interesting. In New Zealand, people experience hardship in making a living in ceramics but have a totally free lifestyle, whereas in Japan one can earn a living but , however, restricted by traditional style pressures.

Exchanging techniques and ideas on the subject of the vase made an impression. New Zealand participants made works using their clay and designs of kiwi fruit and tamarillo. The ceramics made at the workshop were exhibited not only at the School of Art and Design but also at Takayama Citizens' Cultural Centre. It was evident that the participants enjoyed making ceramics and those from New Zealand also had the opportunity to learn something of Japanese culture during homestay programs during the workshop.

In February, 1994, on receiving a grant from the Australia-Japan Foundation, I was able to visit many ceramists in the states of NSW, South Australia, Victoria and Tasmania. The main purpose of my visit was to inspect ceramic opportunities in Australia and to search for lecturers for the next workshop. Since 1981, I have visited Australia five times, usually every second year. I can feel in retrospect, Australia is becoming a multicultural world. I saw ceramic kilns built in open areas of gum trees and attended large-scale ceramic activities which were impressive. The character of the works was clearly shown. Museums are encouraged to support young ceramists.

In October 1994, the Second Hida Takayama Ceramic Workshop was held. Our lecturers were Rynne Tanton from Launceston, Tasmania, Australia, and Kenji Kato from Tajimi, Japan. Following the experiences of the workshop held in 1993, our aim was the search for new possibilities in ceramics. We

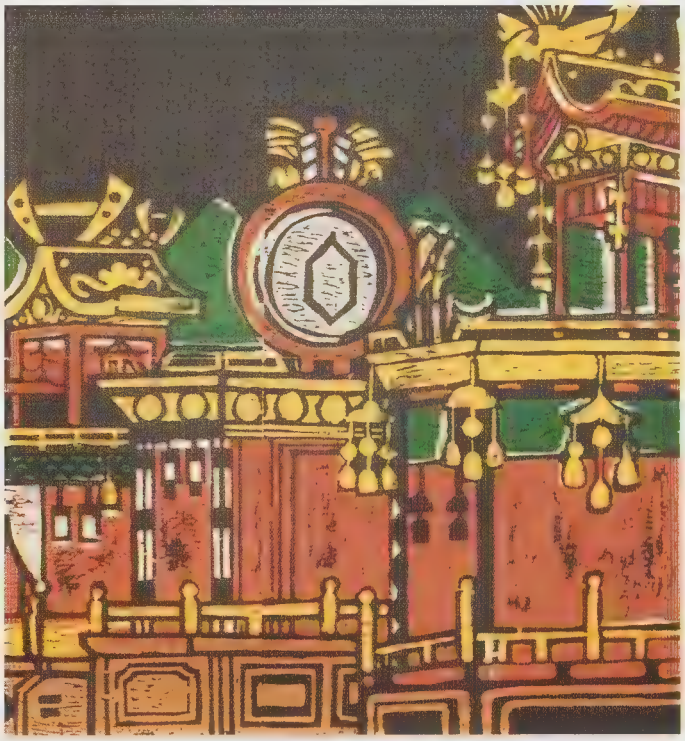
Above left: Demonstration of Rynne Tanton using a gas burner
Above right: Demonstration of Kenji Kato

divided the groups into two, one for technical studies and the other for cultural exchange.

Participants came from Australia and New Zealand and 15 ceramists and students of the Hida Takayama International School of Art and Design attended. After the opening ceremony, Rynne Tanton demonstrated his technique of treating the surface of the clay. He heats the surface of a cylindrical pot with a gas burner and then, holding a wooden modelling tool in his left hand, he opens the cylinder from inside to make the shape fuller. Then the pattern on the surface of the pot become more distinct. He also heats the surfaces of the clay slabs and then changes their shapes. His forming is unique and the pattern looks like the trunk of tree. He says he took this idea from the dried-up soil patterns in water pools left by rain and it reminded me of the bright sunshine in Australia.

On the second day, Kenji Kato demonstrated his techniques. Kato is a famous ceramist from Tajimi, a town of ceramics, and he has been influential in working with Turkish blue pottery. He emphasises, "The beauty of a vessel must be apparent whether it is in use or not." He showed the special quality on the surface of ceramics wares and the delicate treatment on the rim of pot.

The subject of one particular symposium, *The Past, Present and Future of Pottery in Australia, New Zealand and Japan*, compared the ceramics used in everyday life in the three countries. Ceramic art in Australia and New Zealand was influenced by Bernard Leach and Shoji Hamada but, in people's homes, industrial manufactured ceramics are mainly used rather than handmade ceramics. Handmade ceramics has become formative art. By the acceptance of universities to include ceramics in education syllabi, the participants believed that there is hope for the future. In Japan, it is said that the ceramics that are maintaining the beauty of work made in the late 16th century



Above: The Autumn Festival (detail from a woodblock print by junior high school students)
Right: Panel discussion

Azuchi-Momoyama Era, can still be sold. The tea ceremony has also taken a leading role in ceramics. The custom of sending gifts to others has been the mainstay of the ceramic artist for a long time. Ceramics have been used for gifts on such occasions as mid-year and end of year festivals. Therefore, the status of ceramics as gift has added importance and the more famous the potter, the higher the prestige of the giver. The participants concluded that while there is as much room for the acceptance of new techniques, ideas, designs, in Japan it was easier to make a living as a potter.

The Takayama Autumn Festival, one of the three most beautiful festivals in Japan, occurred on the third day of the workshop while the fourth day was spent visiting Shirakawa's kiln in Takayama and enjoying a tea ceremony. Through the cultural exchange of the Autumn Festival and tea ceremony etc., we were able to make everyone understand the reasons why ceramics are related so closely to culture and why people enjoy using ceramics.

The works which were made in the workshops are kept in HISCD as permanent collections. You will see the history of this workshop through the works done by the exchange of people of different countries. This has just started, but the direction is coming clear. We are preparing now for our next workshop in October. We hope every participant learns from this workshop and will apply new inspiration when making their own pieces in the future. This year's subject is *Dish Up*. From different cultures and points of view towards vessels, we wonder what kind of vessels will result. In October, the colour of the leaves turn to red and yellow. Newly born vessels will be filled with many delicacies from the mountains.

Hitoshi Morishita is a ceramic collector. He has been the manager of the workshops in Hida Takayama. For further information on these workshops, contact Hitoshi Morishita, P.O. Box 19, Takayama 506 Japan, Fax; 81-577-32 6410

Works in Progress

Coralie Vernon looks at some semi-industrial methods as ceramists and teachers prepare for the 21st century

Bruce McWhinney. ***Foam prototypes.*** *Individual asymmetrical vases made at Queensbury Hunt*

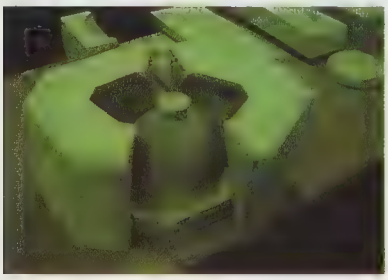
CLAY IS NOT ONLY TURNED BY THE HUMAN HAND but also by the human mind. New technology and methods borrowed from the low-tech end of industrial ceramic production have found their way into the craft, providing a unique learning curve for those just starting to learn. Many will begin their professional careers in a new century. In the meantime, ceramic students stand in the doorway between two centuries, where options for makers are greater than ever.

With the future in mind, the technical education authority of New South Wales (TAFE NSW) recently revised their Diploma and Advanced Diploma courses to introduce new options. Computer aided design (CAD) is among them and can be studied as an elective in the advanced stages of both courses.

What will happen when the cyber generation enters the craft field from the phosphorescent flickering screen? Artist and teacher, Robert Reid, who will begin to teach product design in July at the TAFE NSW Design Centre, Enmore, has been investigating this issue, explaining that in education, computer technology needs to be handled carefully. He says: "The computer is a great tool; it is also a tool which is set up to provide answers. That is not useful to someone, however, if they don't understand the questions. As an educator, my job is to discourage people arriving at answers or solutions that close their inquiry, because that is when they stop learning. What a computer can do is generate a spread of solutions and these can be used to continue the inquiry. The apprentices at this centre use computer technology to design jewellery. Teachers here have found that the student can go only so far in designing a three-dimensional object before the exercise becomes meaningless. The meaning comes from actually making the object they've designed. Until they

TAFE teachers update their skills in mouldmaking and slipcasting at special seminars. Photo: Belinda Mason-Lovering

Block cases and working teapot models



Outer case – teapot mould

Variations on a theme – models and moulds of different spouts and knobs, which can be cast at the same time

make it, it isn't real. When they do make it, there is a shift. The idea of the object on the screen becomes as real as the memory of a tangible object that is simply out of view."

The two approaches present an apparent dichotomy – one involving a long process, working with and handling the material to arrive at the object, and the other determining the finished object before it is made. A design can lose in the translation from idea to object without an understanding of the material. This is why the TAFE NSW jewellery apprentices and ceramic students are encouraged not to pursue the computer option before they have first learnt to work with their hands.

"There is no reason why a ceramic artist cannot produce exhibition work while using other technology for commissions or multiple production. Educationally, our job is to present the options," explained Reid. "It will be interesting to see what options the students will choose to take in their own work. But whether we will see two distinctive strands of work emerging as a response to this technology, with a slick industrial style on the one hand and an intuitive, organic approach on the other, or whether new technology can be used more holistically in the hands of these makers."

The apparent dichotomy between the direct interaction with the material to make the object and the use of technology to reproduce it has a focus in mouldmaking and slipcasting, now compulsory in the TAFE NSW Diploma and Advanced Diploma courses. They are not new technologies, and although they require the design concept be finished before it is made, the making still requires the skills of the human hand.

For ceramic artist, Bruce McWhinney, an exploration of mouldmaking added another dimension to a form he has already explored – the teapot. A teacher of ceramics at Brookvale College of TAFE, McWhinney travelled to the UK in 1993 on a TAFE NSW research grant. There he visited a number of companies including Dart, Wedgewood and Queensbury Hunt.

At Queensbury, McWhinney worked with the company's industrial prototyping techniques, taking one of his own designs to sample production stage. Since his return, he has started teaching these processes in the new courses as well as using them to produce the teapots he will exhibit for the first time at Canberra's Solander Gallery in July, 1996. "Mouldmaking is taking me on a new learning curve; it is a precision process that makes you consider the object carefully," he explains. "My work is precise and I do aim for an almost industrial perfection, deceptively minimalist, so industrial processes do coincide with my concept for my work."

However, the 'dead accuracy' required for a plaster model doesn't give the maker much room to sketch out his or her ideas in three (tangible) dimensions. At Queensbury, McWhinney discovered that dense foam provides a solution to mould-making problems. "Foam is not a nice material to work with but it is a good way to obtain a three-dimensional sketch, and it is much quicker than using plaster. Also, it is a direct process – you sculpt it with different grades of sanding materials, rasps and files. You can cut it with hot wire and glue pieces to it; if you don't like the form you can change it easily. At the end of the process, the finished form won't be accurate enough to be used as an impression for a mould but you can use it as a reference for a more accurate plaster model. It can also serve as a sketch to show to a client."

McWhinney found that the questions of how to block and where to seam the pots led him to produce a number of moulds. The issue, he said, was not how to block a teapot but how to produce the kind of teapots he wanted to

Robert Reid.
Vase I.
Slipcast terracotta, coloured slip. 1100°C. 21 x 19.5 cm. Photo: Robert Reid

make. "I like to include functional details, like the rose at the bottom of the spout, but they can't be inserted unless the spout is cast separately. This is where your object dictates the process, not the other way around."

McWhinney found a combination of industrial and hand methods was required to achieve the results he wanted. Turning the lids, stands, bodies and knobs on an industrial whirler, he hand modelled the spouts in plaster, as well as the handles, which he cut and modelled from plaster slabs. The process, he says, demands the same integrity as that of building an object by hand. You cannot cut corners. To produce a quality product you need a high quality mould. It requires precision and an intimate understanding of the materials. These processes provide students with future options – including making their own moulds, making moulds for other makers, or knowing how to work with someone who makes moulds for them.

"After going through my own learning curve with these processes, I have found I have a greater focus in my work on the quality of each piece, and a greater sensitivity to the way they feel, work and look."

According to Robert Reid, students are not the only ones poised on the threshold of the new century, and with the Olympic Games in Australia just a few years away, now is a good time for makers to look at where they will be positioned in the future: students learning now have just enough time to learn

Bruce McWhinney updates TAFE teachers on methods used in overseas potteries. Photo: Belinda Mason-Lovering

Bruce McWhinney. ***Teapot.*** *Prototype. Earthenware, glaze*

Bruce McWhinney. ***Teapot and stand.*** *Prototype. Earthenware, matt glaze*

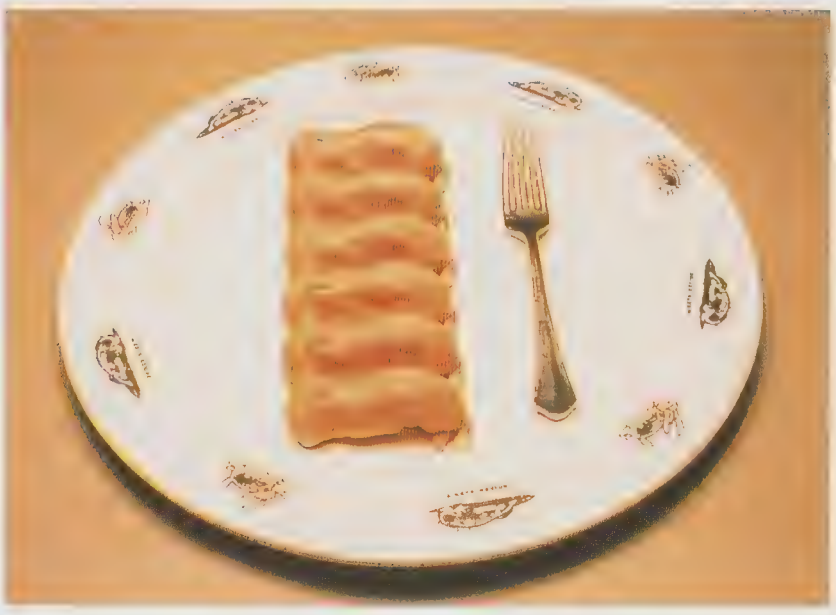
the craft and produce work for the year 2000. "Makers also have enough time to start using low-tech industrial options with their production work and start positioning themselves for the opportunities that are opening up for us, where we can get paid not only for our understanding of the craft, but also for our ideas, and skills in design."

Coralie Vernon is a freelance writer who works in the fields of education, business and performing arts. Her company, Plain Talk Communication, is based in Sydney. The technical update sessions were organised by the Arts and Media Industry Training Division of TAFE. Robert Reid will be demonstrating mouldmaking for Kilns and Pottery Supply at the National Potters Conference, July, 1996. Photographs by Bruce McWhinney unless otherwise credited.

Ceramics and Print

Richard Shaw, USA. ***Journals with Paper Ship.*** *1993. Porcelain, overglaze decals. 36 x 37 cm.*

Les Lawrence. USA. ***New Visions Teapot.*** *1995. Porcelain, stainless steel, photo monoprint. 38 x 16 x 5 cm.*



Caroline Taylor. UK. ***Recipe for Love.*** *1994. Plate with slipcast skinned rabbits. Screen-printed decals, 30 cm/diam.*

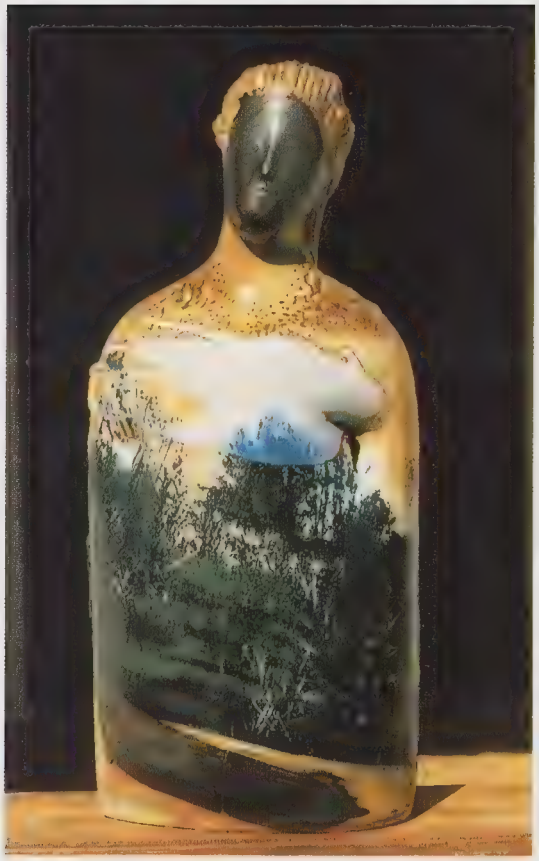
FOR MANY CERAMISTS, ANY TALK OF PRINT AND CERAMICS might suggest a potters' simple stamp used denote the signature of the maker on the base of a jug or plate, or those kitsch decals so beloved of the ceramics industry. But the word 'print' means to impress, and what more impressionable material is there than clay? There are, in fact, a range of print processes than can be used with ceramic materials which we can see from history; and there are traditions and conventions which help to form and inform the nature of contemporary work in this field.

Stephanie Brown in her essay for the book, *Hot off the Press*, observes: "Like figurative ceramics, printing words on pottery is a revival of ancient practice. The Sumerians, Babylonians and Assyrians all used cuneiform writing inscribed into clay tablets or short cylinders of clay subsequently baked in ovens. Some clay cylinders were used as seals, rolled over soft clay to leave an impression. Mycenaean potters in ancient Greece used sponges to transfer colour and pattern to forms, and ornate medieval tiles were made using simple relief printing and inlays. But the main use and development of print and clay has come from the pottery industry which has exploited print processes and ceramics materials for several hundred years to bring cheap decorated ware within the reach of most people."

Scott Rench. ***Coming to a Theatre Near You.*** *1994. Printed glaze on clay. 20 cm.*

It is perhaps this association with industry that has not endeared print to most potters, but other visual artists have been far less worried about its associations. Artists have long used industrial processes for creative purposes; after all, etching and engraving, screen and block printing were all originally developed as means of printing for the purposes of mass communication. It is not difficult to think of famous works of art made using print processes and, in the 1950s, Picasso's production of hundreds of ceramic works in clay from lino cuts and carved plaster moulds further developed the fine artist's exploitation of the limited edition print into a new medium.

Today's potters have likewise developed the processes of throwing, away from the use (and potential) it has for mass production, towards the development and exploitation of form and the facility it gives for self expression. Other industrial processes – jigger jolleying and slipcasting, have begun to impinge on the consciousness of the contemporary ceramist, but ceramic artists have not until recently embraced the opportunities provided by print and clay. The obsession with clay's ability to be three-dimensional with the process of fire and the exploitation of form above surface, has meant a neglect of the graphic possibilities of ceramic materials. Sam Haille began experimenting with simple screen prints in the early 1940s, but his was an isolated



Left: Maria Geszler. Hungary. ***Rousseau's Garden.*** *Porcelain, silk screen, salt-glaze. 1300°C. 6 x 34 x 15 cm. Right: Neil Brownsword. UK.* ***Not Tonight.*** *1995. Assembled ceramic sculpture, printed elements. 87 cm/h.*

gambit. Picasso worked with print and clay in the '50s and '60s before Robert Arneson, Howard Kottler, Richard Shaw (and others in the USA) began to use commercial screen printed decals on ceramic forms in the late 1960s.

More recently, the blurring of lines between different areas of the decorative, applied and visual arts has resulted in new generations of makers and artists whose attitude to clay is fundamentally different to some of their predecessors. Just because clay can make three dimensional forms, it does not follow that this is its only facility; nor does it follow that in order to be a ceramic artist, the exploration of form above all else has to be a compulsory element of successful work. Ceramic surfaces, colours and glazes can be graphic; they can contain words and convey complex visual imagery. For some makers these qualities are of equal or greater importance than the concerns of the vessel, volume and form, and print processes have become part of their work. In addition, photographers and printmakers have been moved to use ceramic materials for the qualities only a ceramic surface can impart to a work.

In many ways, the ceramist and printmaker work in similar ways, needing processes of drying, impression, transfer of colour, by machinery or kiln before a finished work is revealed. Both need a degree of patience, an understanding of process, a realisation that all is not completely within immediate control. There is a struggle over a period of time to harness the unexpected and tame the uncontrollable for particular ends. In addition, anybody who has made any ceramics will know the excitement and anticipation as work is loaded and fired in the kiln, the cooling, the joy (or grief) of the moment when the kiln door is nudged open and the jewels of the fired ceramic objects reveal themselves. For the printmaker, the excitement and anticipation is as the paper comes off the press, or as the squeegee pulls across the silk screen, and the subsequent revelation of the perfect (or not so perfect) print. For many ceramic printmakers logically there is double the excitement (or anticipation).

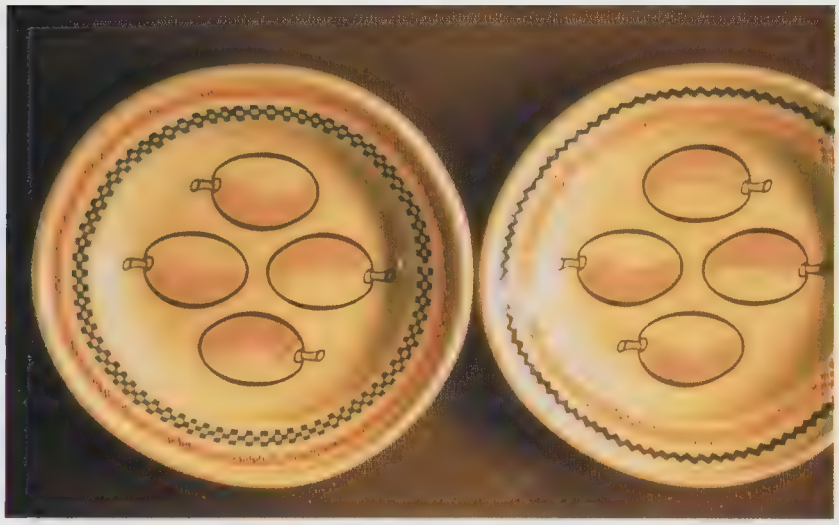
Grayson Perry. UK. ***Contemporary Art for the Traditional Interior*** *(detail). 1995. Coiled pot, stencilled slip, painted oxide, decals, lustre. 55 cm/h.*

For printmakers or photographers, ceramic surfaces can offer a degree of permanency essential for work. It is in this context that the extraordinary photographs on porcelain that can be found in parts of Europe adorning gravestones were first developed. An array of ceramic photographic processes were developed during the industrial revolution but most were not profitable enough for prolonged use in mass production. In some cultures it is customary to place a picture of the deceased on their tomb, and the ceramic photograph weathers the ravages of time perfectly. Later on, the pottery industry using mainly photo silkscreen/litho processes has developed the ceramic photograph for extensive use on souvenirs and commemorative ware.

Peter Lenzo (USA), Andrew Weatherhead (UK) and Julie Eyers (UK) use portraiture as an important or key element of their work, clearly drawing on this element of ceramic tradition. Grayson Perry (UK) incorporates elements of portraiture amongst the sgraffito, sprigged and painted elements of the surface of his voluminous and generously coiled pots.

In a similar vein, Howard Kottler, (USA) made use of open stock transfers. Kottler used them quite deliberately, mocking both the absurdity of the fine art world and the world of studio pottery in which his work had to be sold, by cutting and altering transfer images of famous paintings and applying them to factory made whiteware or bone china. His use of images of paintings to decorate plates has a long precedent: engravings of landscapes from Lorraine and Poussin were common on Staffordshire Blue Pottery last century and industrial ceramic printers like Baileys in Stoke-on-Trent today have a range of screen and litho printed on glaze transfers based on famous works of art available. Recently, the British artist, Conrad Atkinson, used these fine art images, and the traditional Willow Pattern on his slip cast land mines, part of his *Mine Culture* installation, a piece which jars the senses with its juxtaposition of the cosy and the lethal.

The whole tradition of Staffordshire Blue Pottery and other associated



Top right: Richard Slee. UK. ***Pair of Plates (detail).*** *1988. Earthenware. Pressmoulded, decal, rubber stamps. Top left: Julie Eyers. Plate from* ***The Wedding Service.*** *1994. Photo silk screen, transfer*

European blue ware with its bizarre collection of oriental imagery mixed with landscapes from Italy, Holland and rural England, is a rich source for artists to draw on. Robert Dawson (*Aesthetic Sabotage*), has been exploding, altering and crumpling the willow pattern. Such a familiar series of images give new life by simple manipulation. Karen Densham dilutes it with a washed and sprayed out monoprint. Charles Krafft (USA) too draws on European 'Blue' traditions, but his in a more sinister way in the *Disasterware* series.

Industrially produced Blue and White has a complex visual language of its own, which is at the same time both familiar and unknown (what do those semi abstract symbols around the Willow pattern signify?) It is, like contemporary ceramics, collectable, but probably not by the same people. For me the intrigue and excitement lies in crossing the boundaries, incorporating familiar imagery from different worlds, the cosy romanticised idealised Italian, Chinese and English rural landscapes with the more brutal reality of a monstrous nuclear power plant dumped in the middle of a real English rural landscape. Maria Geszler (Hungary) shows the beauty of the industrial landscape in her large screen printed porcelain windows and forms. *The Poetry of the Industrial Landscape* pieces have a bleak, stark quality, strangely warmed by the bleeding colour of the prints. For her the process of high firing with salt is an integral part of the work, and the unpredictability of the screen print and the kiln firing producing subtle and intense qualities which enhance the original image. They also mean that those pieces surviving the making and firing processes are precious; for one to work many will fail.

Vicky Shaw (UK) relies on the firing process to produce extraordinary qualities in her abstracted screen prints. Viewed in a magazine, they might appear as large abstract prints on paper; in reality they are small delicate prints of glaze, slips and ceramic pigments on paper thin porcelain. Uncomplicated by the demands and expectations that form makes of glaze and pigment, she has created ceramic screen prints of beauty. In another way, Les Lawrence utilises ceramic qualities, but in his case those of soft clay, to turn screen printed monoprints in porcelain from plaster, into surreal tea pots and forms held together by tacks and wires and staples. Here the image is clear and hard, simple black pigment on unglazed porcelain; but firing causes the fossilisation of soft clay, and the transformation of steel pins. In his *New Visions Vessels* the fine art image, dollar bills and computer screens jumble together on the surface of these paradoxical pots – pots which are evidently the work of a human hand, but which owe much to the industrial and technological world in which we live. In a similar vein, the works of Scott Rench (USA) and Richard Slee (UK) show how technology, computers, printing and ceramic materials have much creative potential for the individual artist.

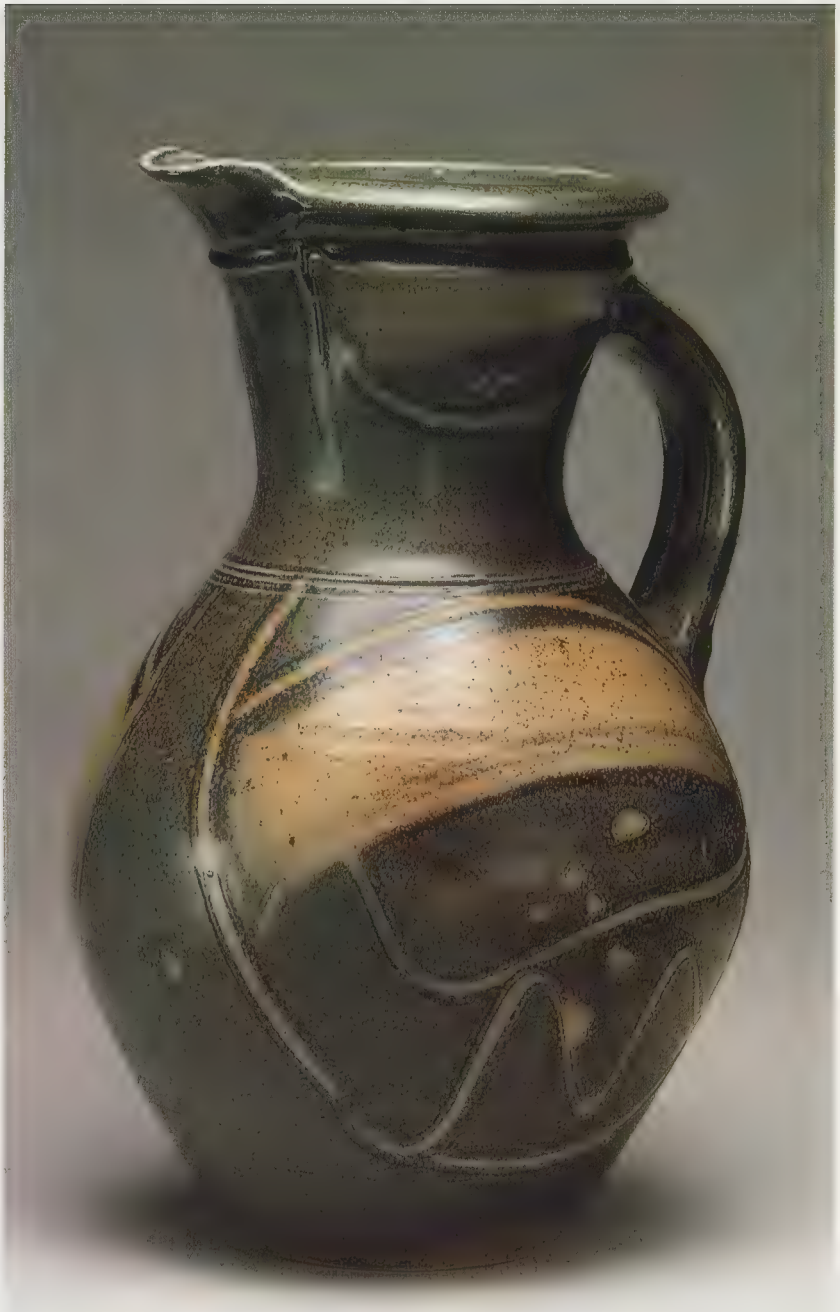
Above: Robert Dawson. UK. ***Willow Pattern Plate.*** *1994. Overglaze enamel print on bone china plate*

Print is innovative and individual; it can also be for the pyrotechnic, (as many potters clearly are). Janet Williams (UK/USA) starts to explore the possibilities of the kiln as a printing press in Prairie Flora in *Leaves.* Here the impressions left by leaves, flora and fauna in soft clay are enhanced by their subtle carbonised residues. Her works sit close by that of Paul Mason (UK) whose fossilisation of image is also deliberate but achieved by press moulding, impressed type and screen printing on commercial tiles.

Gebador Peterdi in the introduction to his comprehensive manual on printmaking wrote: "I make prints because in using the metal, the wood, and other materials available, I can express things that I cannot express by any other means. In other words, I am interested in printmaking not as a means of reproduction but as an original creative medium. Even if I could pull only one print from each of my plates I would still make them." For ceramic artist/printmakers, the use of ceramic materials enhance and extend the possibilities of print still further. Makers are beginning to explore the storehouse of industrial imagery and process. They are adapting the fine art print and developing exclusively ceramic printing processes and works.

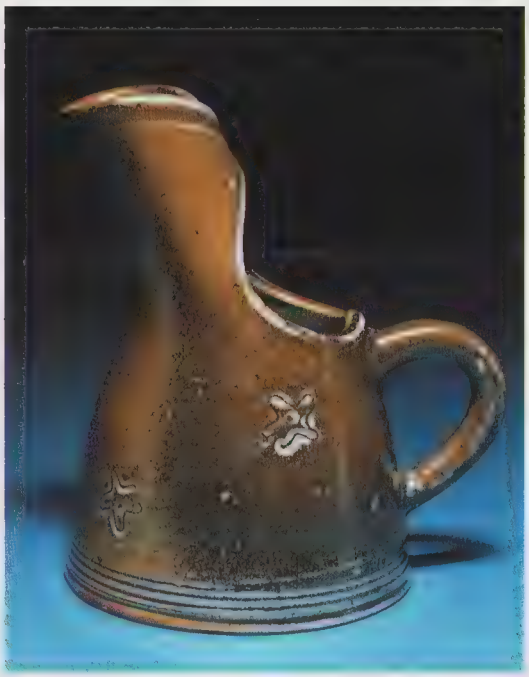
Paul Scott is a ceramic artist, clay editor for *Artists Newsletter* (UK) and the author of the book, *Ceramics and Print*, published by A&C Black and Kangaroo Press. *Hot off the Press, Ceramics and Print*, is the first exhibition to show the wide range of work being produced by the marriage of print and ceramic processes. It brings together a significant body of work by ceramists, printmakers, potters, photographers and other visual artists, and includes not only contemporary work, but also historical and industrially produced ware. Originating from rural West Cumbria in the far north of England, it has been curated by Paul Scott and Terry Bennett, Visual Arts Officer, Tulle House, Carlisle Museum and Art Gallery. The exhibition has been created with the financial support of the UK Crafts Council, the Northern Arts Regional Art Board, Carlisle City Council and Cumbria County Council.

Above: Mick Casson. Portrait, jug and teapots



Mick & Sheila Casson at Wobage Farm

Profiles of 20th Century Ceramicists, Volume 2. Ceramics Invision, Cae Bedw, Birlley. Whitney on Wye. Herefordshire HR3 6JH. Price £30



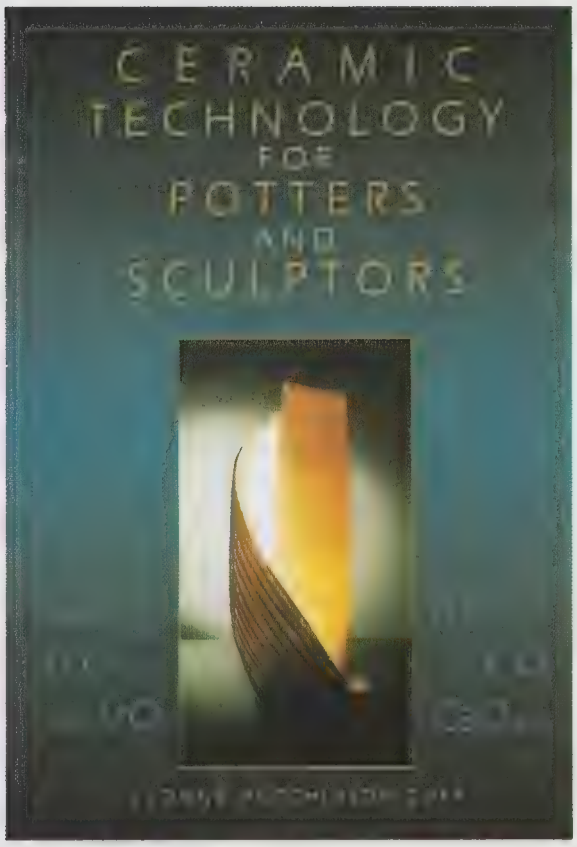
There is no obvious attempt by either Mick or Sheila Casson to teach via this video, instead it seems there is a pleasure in explaining and sharing ideas and techniques. Mick discusses the search for a personal credo through pottery believing that the methods and processes that a potter uses are not distinct from his personal expression. Reliance and the ability to bounce back are a potter's most important attributes, he says. We do learn from them, however, as Mick makes jugs and teapots, as Sheila makes bowls and sauce pots. After 50 years of making, Mick still uses a pin to check the thickness of the base of a cylinder and admits to difficulties in throwing certain forms in porcelain. The close-up shots show technical details of making and how spouts are formed, how sections and applied handles are joined. Recipes are given. Weights for the sections of a pot are given (Mick says he has an inaccurate eye) as he throws steadily onwards, discussing the proportions of jugs and the evidence of the processes that are pleasing to him. His teapots, that are quite fussy and intricate to make, are shown: body, lid, spout, knob, handle and feet are taken logically step-by-step. Sheila cuts and folds the clay of her jugs at just the right stage of leatherhard to form and tilt the spouts.

History plays an important role in the aesthetic of both these potters and inspiration is taken from the historical forms of museum pots. But when it comes to making, the action is quick and definite; feeling and intuition take over and a natural balance of the parts of a pot come together in a satisfying way. Mick explains salt-glaze as he fires the kiln; he tells anecdotes as Sheila hovers in the background. We see the pottery workshop and the showroom and hear how a cooperative has been formed by five potters and other craftspeople who have workshops at Wobage. The style of life at Wobage seems calm – even the music of the video was lyrical and not at all dominant.

The video begins with some shots of Rufford Art Centre. At first I thought that Wobage had gone in for some elaborate topiary and manicured gardens. However, it seemed that Mick was having an exhibition at Rufford (which didn't include Sheila), just one of many exhibitions that these potters have held over their lives. More important was the message that a satisfying life can be achieved as a potter by using one's whole experience to create work, with imagination and purpose. Even conservative potters have the ability to continually develop, change and grow, says Mick Casson. *JM.*

Top: Sauce jugs by Sheila Casson. Above: The showroom at Wobage Farm

Harry Davis clay body recipe used by Mick and Sheila Casson:
Hyplas clay 60%
China clay 20%
Cornish stone 20%



Ceramic Technology for Potters and Sculptors

by Yvonne Hutchinson Cuff

Available June, 1996
440 pp, 34 colour and 93 b/w illus.
Cloth – $45.00
ISBN 0-8122-3071-X,
Paper – $24.95
ISBN 0-8122-1377-7
Published by
The University of Pennsylvania Press in association with A&C Black (UK) and Craftsman House (Australia)

Available from *CeramicsTECHNICAL*
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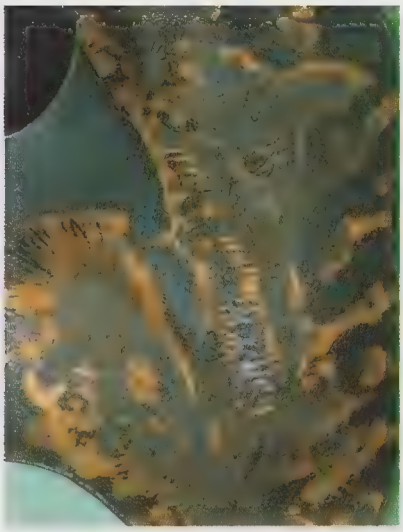
A mole is the unit of quantity of a chemical substance. This picture shows mole weights of various chemicals. Photo: Yvonne Hutchinson Cuff

Ceramic Technology for Potters and Sculptors is a solid text book intended for college students, particularly those wishing to enter ceramic industry or those seeking a scientific basis for experimentation. The chemistry of ceramic processes is dealt with thoroughly, making it a comprehensive and accessible instructional manual. The technology involved in making and firing ceramics is well covered. The book is divided into three parts: Background Sciences, Workshop Practice and Raw Materials; Clay Bodies, Slips, and Casting Slips; and Glaze and Colour. Teachers will find this book useful as a practical guide and reference aid. There are 46 exercises offering detailed explanations of the expected results together with supporting discussion. For the experienced potter or sculptor there are advanced sections.

Chapter headings show the scope: Essential Chemistry, The Natural Process: Crystallisation of Minerals and the Formation of Rocks, The Changing Landscape and the Evolution of Clay, Clay Deposits and the Mineralogy of Clay, Workshop Practice and the Theory of Kiln Firing, The Ceramic Process: Reversing the Natural Process Preparing and Testing Natural Clay for Workshop Use, Clay Bodies: Using Blends of Natural Clay, Clay Bodies for Specific Purposes, Using Dry Raw Materials, The Clay-Glaze Relationship, Clay Slips, and Casting Slips, Introduction to Glazes and Glaze Development, The Life History of a Melting Glaze and Glaze Formulation, The Theory of Colour and the Right Glaze for the Colour. Yvonne Hutchinson Cuff has an MA from the Royal College of Art, Dip. AD. (Ceramics) University of London and is a ceramic consultant and lecturer as well as a practising potter. An edited version of one of the exercises is reproduced here in order to demonstrate the step-by-step procedures suggested.



Black porcelain with lustre screen print. The screen print was taken from a photograph of a cloud formation and a standard screen printing process was used to print directly on leatherhard clay. The clay was then folded into shape. The exercise below discusses the making of coloured clays.

EXERCISE: **Adding Colour to a White Body**

Colour may be added as oxides or as stains, as a single colour or as a mix of colours. Remember that bodies require larger additions than slips or glazes.

AIM

To add colour to a white earthenware, white stoneware, or porcelain body. Tests for one colour (or one colour mix) are described. These may be repeated for other colours.

MATERIALS

You will need 100 g dry weight of clay body rendered down to the plastic state. You will also need your choice of single colouring oxide (or mix of colouring oxides). The colour additions given below are for oxides (if using cobalt or copper carbonate record this in your notebook). If you use mixes of colour, the total amount of colour should equal the amounts given below. A little transparent glaze will be required for the firing temperature to be used.

METHOD

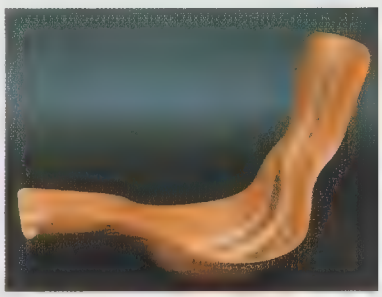
1. Divide the clay into five equal parts (four for colour tests, one test without colour). Each portion will contain 20 g dry weight of clay.

2. Weigh out the four lots of colour (see list below). Soak each colour as instructed above, then wedge each lot of colour into a lump of plastic clay, taking care not to lose any. From each clay make a plastic button (make two if firing in oxidisation and reduction) . Cover one side with a transparent glaze and inscribe the colour addition on the other side.

Test 1: 20 g dry weight clay (no colour)
Test 2: 20 g dry weight clay + 1 g colour
Test 3: 20 g dry weight clay + 2 g colour
Test 4: 20 g dry weight clay + 3 g colour
Test 5: 20 g dry weight clay + 4 g colour

This gives the percentage colour additions of 0%, 5%, 10%, 15% and 20%.

Fire the tests in the appropriate firing range for the clay body and glaze used and record the top temperature when you finish the firing.



Helen Swain. UK. ***Flowing Vessel.*** *Terracotta, iron oxide. Photo: Derek Large*

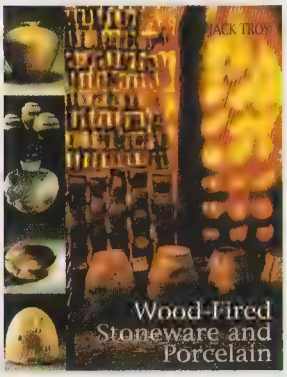
ASSESSMENT

Study the quality and depth of the colour and the texture of the body. Note whether the extra fluxing action of the colour has had an effect. Assess this by comparing the coloured results with the test without colour. Choose the depth of colour you would like to work with. If it has a high percentage of colour, does it have a smooth surface, or is it blistered from overfiring? If overfired (and the correct firing temperature has been used) you should repeat the tests at a slightly lower temperature.

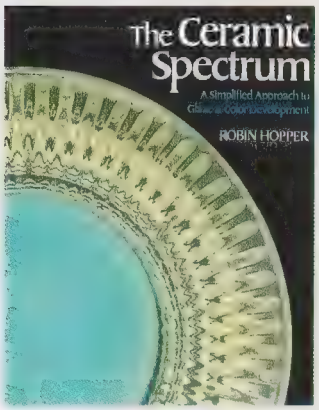
This method works well with single colouring oxides or stains. If you wish to make a black body, it is suggested that you use a stain for better dispersion of colour. Three button tests should be tried containing additions of 12%, 15% and 18% of black body stain. Try to avoid a stain containing chromia if possible, because it tends to flash and may settle on other wares in the kiln during firing.

Recommended Reading

Japanese Studio Crafts, Tradition and the Avant Garde by Robert Faulkner. Covering all crafts with a major section on ceramics. Notes, chronologies, maps. Full colour, large pictures. $140 or $150 posted.



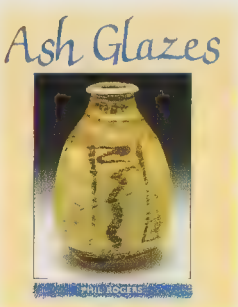
Wood Fired Stoneware and Porcelain by Jack Troy. All wood firing potters will want this excellently written book. $70 or $75 posted.



The Ceramic Spectrum by Robin Hopper. A simplified approach to glaze and colour. $95 or $105 posted.

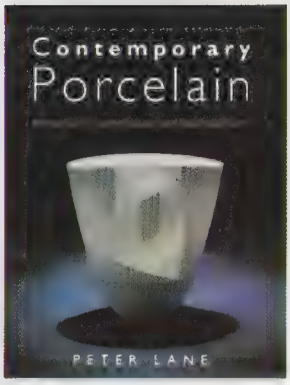
Paper Clay for Ceramic Sculptors by Rosette Gault. Detailed, useful, technical, practical. $35 or $40 posted.

The Electric Kiln. A Ceramics Handbook by Harry Fraser. Well illustrated and clearly written. A useful text. $30 or $36 posted.



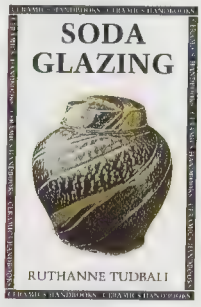
Ash Glazes by Phil Rogers. Well written, practical, for the lover of traditional glazes. $60 or $70 posted.

Smoke-fired Pottery by Jane Perryman. Well illustrated in black and white and colour. Shows how to obtain surface effects in saggars, pits and kilns.
$60 or $65 posted.



Contemporary Porcelain, Materials, techniques and expressions by Peter Lane. Good coverage of work being made throughout the world. Black and white and colour photos. $65 or $75 posted.

Barbara Nanning. Ceramics. Travels in Time and Space. Galaxy and Terra Series. In Dutch and English. Good photographs and text showing inspiration behind this artist's work. $35 or $40 posted.



Soda Glazing by Ruthanne Tudball. Practical and inspiring. $30 or $36 posted.

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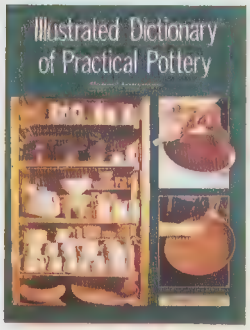
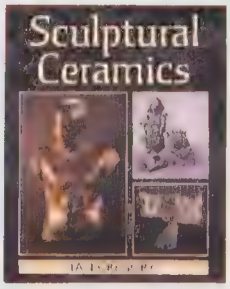
Recommended Reading

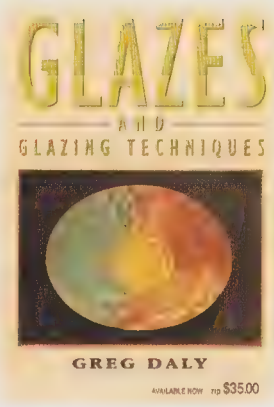
Salt-Glaze Ceramics – An International Perspective
by Janet Mansfield. Sixty international ceramic artists, their ideas and techniques. Beautifully presented, hard covers. $70 or $75 posted.



Illustrated Dictionary of Practical Pottery
by Robert Fournier. Well illustrated and informative, all topics of pottery covered. $70 or $80 posted.



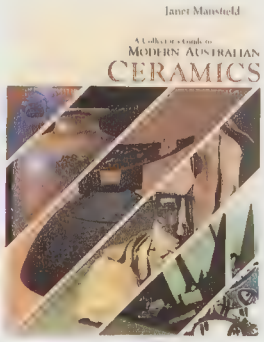
Sculptural Ceramics
by Ian Gregory. A resource of information on ceramic sculptors and their ideas. $40 or $48 posted.



Glazes and Glazing Techniques by Greg Daly. Practical ways to obtain individual and reliable glazes. Great value. $35 or $40 posted.

Stoneware Glazes: A Systematic approach
by Ian Currie. A practical book with step-by-step methods to understanding glazes. $40 or $48 posted.

Contemporary Ceramic Art in Australia and New Zealand by Janet Mansfield. A contemporary survey of the work of ceramic artists from both countries across the whole field. Full colour. Hard cover. $75 or $80 posted.



A Collector's Guide to Modern Australian Ceramics by Janet Mansfield. Describes the intentions and processes of 60 Australian potters. Colour and mono. Hard cover. $65 or $70 posted.

Ian Sprague 1920 – 1994 by various authors in tribute to this influential potter. Colour plates and B&W. $12 or $14 posted.

Raku, A Review of Contemporary Work by Tim Andrews. Practical information and inspiration for all interested in contemporary ceramics. $60 or $68 posted.

Visiting the Mino Kilns by Janet Barriskill. Toyozo Arakawa's study of Shino glazes. Examples of new works of the Mino potters $65 or $70 posted

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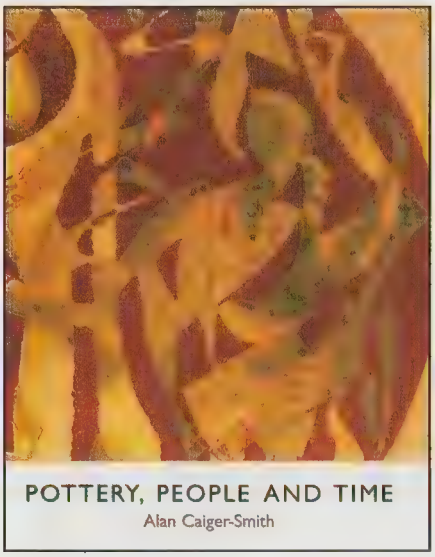

Pottery, People and Time

by Alan Caiger-Smith

Published by Richard Dennis, UK

Review by Barbara Bennett

Price: $ 70, $75 posted

Available from

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35 William Street Paddington NSW 2021, and Artisan Books, Meat Market Craft Centre, 42 Courtney Street, North Melbourne, Victoria 3051

Alan Caiger-Smith.
***Large lustre dish.** 1994*

I read Alan Caiger-Smith's latest book, *Pottery, People and Time, A Workshop in Action* (Richard Dennis, 1995) with hardly a pause for eating or sleeping. Then I re-read it more slowly and carefully. I visited the Aldermaston Pottery during its time of peak performance in 1979, when there were seven or eight potters employed. I walked up the narrow stairs where a notice begged visitors not to carry pots down themselves but to ask one of the staff for help. The stairs lead to the loft, once used for hay storage, above the main work area, originally a smithy. The loft was where the completed pots were displayed for sale. It was dark and when I reached to top of the stairs, someone turned on the lights, so that suddenly, before me, were the glowing colours of the display; an Aladdin's cave, brilliant and mysterious. I will never forget that moment.

Caiger-Smith's book is a concise and readable (reader-friendly) history of the Aldermaston Pottery and of its founder, the author. He describes the practicalities of pottery-making and the operation of a productive, self-supporting workshop in a way that makes sense.

Not only are the practical details dealt with: from the right mix of clay and raw materials for throwing to the cutting and stacking of willow wood for the kiln. But also Alan Caiger-Smith shares with us, his readers, his seeking, in many places and over many years, the roots of the philosophies that lie behind a craftperson's need to produce objects of use and beauty. I found particularly appealing the book's balance between the esoteric and the pragmatic.

In the chapter entitled Centering, for example, he quotes from T.S. Eliot:

Only by the form, the pattern, Can words or music reach the stillness, as a Chinese jar still moves perpetually in its stillness.

And again, from John Keats:

Thou, silent form, dost tease us out of thought as doth eternity.

Then, having lifted us into the realms of imagination, as we identify with a potter exploring the movement and stillness of the clay on the spinning wheel, he drops us back into the real world with Edgar Campden, his permanent right-hand man, saying, "Philosophy and that, it gets you nowhere."

This is a book for anyone who has ever toyed with the idea of a self-supporting craft workshop, for anyone who is interested in pottery and its making and its history, and for anyone who likes reading about people working together and their interaction, their aspirations and their achievements.

Alan Caiger-Smith is the author of *Tin-Glaze Pottery in Europe and the Islamic World* (1973) and *Lustre Pottery* (1985). An article on his workshop may be read in 'A Phase of Necessity' by Helen Stephens in *Ceramics: Art and Perception*, Vol, 11, pp 86–89.

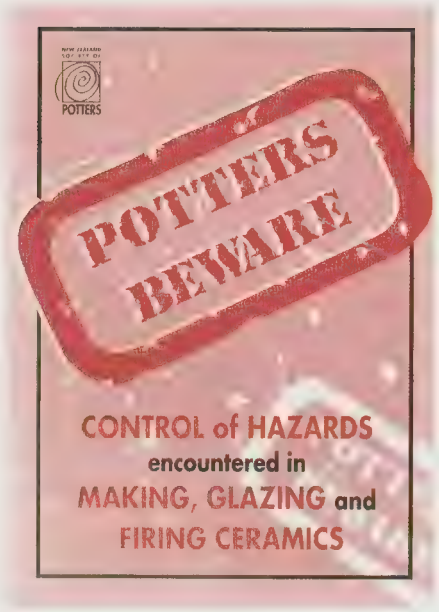
Potters Beware

Control of Hazards Encountered in Making, Glazing and Firing Ceramics

by Rosemary Perry. $12

Review by Howard Williams

Available from the New Zealand Society of Potters, 100 Lochhead Road, RD 6, Tauranga NZ, and CeramicsTECHNICAL , 35 William Street, Paddington NSW 2021 Australia



This booklet is designed as a quick and easy reference to help potters avoid hazards associated with toxic substances. Many potters report symptoms caused by their involvement with these substances, conditions which were mostly avoidable had they had prior knowledge and taken adequate precautions. Long gone are the days when ignorance allowed potters to handle materials with no concern for their possible long-term toxic effects, to be oblivious of the danger of fumes from a firing kiln, or to use machinery in unsafe conditions. This is important for each individual's own safety and health but, even more, in these days of concern for correct working conditions, for the safety of others working under one's direct responsibility.

Included is 'Hazards to Customers'. The law has strict regulations forbidding the sale of food containers capable of imparting toxic substances to any food stored, prepared or cooked in them. The seller as well as the maker is liable.

Described are various types of glazes, their vapours during firing and their correct storage procedures. Ceramic fibre is discussed; and there are sections on dermatitis, fire, burns, electric shock, hearing loss and musculo-skeletal problems. Dust – respiratory masks, ventilation and toxic fumes (both organic and metal) are dealt with. Charts show the commonest materials used in the pottery with the problems they can cause and how these can be minimised or avoided.

This is an excellent booklet – it could save your life or prevent unnecessary exposure to materials ultimately injurious to your health or the health of those working with you, studying under you or living close to you – or even those who buy your pots. A the reasonable price of $12, it would be irresponsible not to be acquainted with it.

Howard Williams is a ceramic artist, writer and editor of *NZ Potter*. This review is an extract of his review which first appeared in *CLAYNEWS*, the NZ Society of Potters Newsletter, Vol. 16, 1996.

MATERIAL	SKIN	INHALATION	INGESTION
LITHIUM CARBONATE Li_2CO_3 LITHIUM FELSPAR (Petalite) $Li_2OAl_2O_3 8SiO_2$	LOW Irritation	MODERATE Irritation Lepidolite due to mica may cause silicosis	MODERATE Large doses may cause thyroid enlargement Heart, brain and kidney damage May cause birth defects
MAGNESIUM CARBONATE $MgCO_3$ MAGNESIUM SILICATE (Talc) $3MgO_4SiO_2H_2O$	LOW Embedded particles can ulcerate skin NON-TOXIC	MEDIUM Dust irritates mucous membrane Chronic inhalation of talc may cause talcosis (similar to silicosis). If contaminated with asbestos may cause lung cancer	NON-TOXIC
MANGANESE DIOXIDE MnO_2 MANGANESE CARBONATE $MnCO_3$	LOW May be absorbed through the skin.	HIGH Chronic inhalation of dust or fumes or ingestion may cause manganese poisoning or "manganism" - a serious disease affecting the central nervous system Early symptoms are fatigue, loss of appetite, joint pain, weakness in the legs, tremors of the hands, muscular spasms and leg cramps, loss of co-ordination with symptoms resembling Parkinson's disease. Chronic poisoning can be from heavy exposure for three months, but usually takes one to three years If removed from the source before permanent disability, some improvement will occur Absorption may affect the immune system and reproduction. Iron deficiency appears to increase manganese absorption.	HIGH
NICKEL OXIDE NiO NICKEL CARBONATE $NiCO_3$	HIGH Irritation Nickel itch precedes allergic dermatitis	MODERATE Irritation of upper respiratory tract, may cause lung and nasal cancer Nickel carbonyl $Ni(CO)4$ produced during reduction firing is highly toxic	MODERATE Nausea, vomiting and giddiness.
PLATINUM Pt	MODERATE Allergic dermatitis.	MODERATE Fumes may cause respiratory distress and asthma	MODERATE May affect central nervous system and kidneys.
SELENIUM Se	MODERATE Dermatitis Corrosive to eyes, skin and around fingernails	MODERATE Dust and fumes corrosive May cause pulmonary oedema Garlic odour of the breath	MODERATE Gastritis. Discolouration of the teeth. May affect liver & nervous system
	Chronic exposure may cause white streaks on the nails and hair loss Absorbed through skin, lungs, mouth and the placenta		

*Above: A page from **Potters Beware** showing part of a table detailing the toxic effects of glaze materials. These materials show degrees of toxicity through skin, by inhalation or ingestion. They are graded low, moderate or high. The latter should be used with extreme care.*

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Paper Clay by Rosette Gault. $40 posted
"Ambitious, experimental and daring sculptural projects may now be attempted by artists who choose to use the medium of paper clay ceramics. Paper pulp, added as an ingredient to the clay body, burns away early in the firing, leaving a familiar and durable ceramic product virtually unrecognisable from conventional ceramics except that the fired paper ceramic weighs less. The ability to work multiple layers of wet paper clay slip, plastic clay and dry paper clay together and to imbed or insert fragments of dry, bisqued or glazed clay into the structure and fire it intact, opens up possibilities in ceramic sculpture." Rosette Gault writing in *Ceramics: Art and Perception*, No. 18, 1994.
This book has changed the rules of what is possible in making difficult forms in ceramics. Full of technical information and processes, this book by Rosette Gault is well set out and covers the preparation and use of paper clay in a practical, easy to read manner.

Stoneware Glaze: A Systematic Approach by Ian Currie. $48 posted
This second edition of *Stoneware Glazes* covers basic chemistry and experimental procedures that are logical and comprehensive. This is a book to work with. After gaining an understanding of basic glazes, their formulation, the materials involved and the equipment needed, the text moves on to specific glazes: crystalline, matt, chun, iron, celadon, Kuan, shino and copper glazes. Also covered are natural ash glazes from wood firing and glazes made from rock materials. Presented as a course for study, especially for groups of potters working together, Ian Currie leads the potter gently into glaze chemistry. As he explains in his introduction: "This is meant to be a practical course with just enough theory to enable you to produce the fired results; the ultimate teaching aid is not here in this book but in the fired sets of related glazes it helps you to produce. "
Suggestions for study, information on reliability of raw materials and the variations one can expect to find, as well as guidelines for selecting raw materials, are all noted. How to start, how to read complex diagrams, and how to assess results are given. How to identify rock and minerals, some simple testing procedures for rock dusts and for blending minerals are all included. There are diagrams to follow on triaxial blends, tables on material analyses, lists of reference books, plans of kilns and graphs of firings. Colour tests are outlined. Overall, this book gives the potter a key to understanding glaze principles through a series of exercises and experiments. The calculations are easy to follow, the methodology set out clearly from the preparation of the materials, the calculation of the recipes to the application and assessing of results.

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fibre art
surface design
jewellery
metalsmithing
ceramics
glass

BARIUM STABILITY IN POTTERY GLAZES

AN ANU RESEARCH PROJECT

The popularity of barium glazes for both functional and non functional ceramics continues in the face of absolute ignorance about their stability. Two years ago a brief examination by Janet DeBoos of a range of barium glazes indicated that their stability varied in totally unpredictable ways. It became clear that a much more comprehensive study needed to be undertaken with appropriate funding and access to chemical analysis (particularly atomic absorption spectroscopy). With the help of an ARC (Australian Research Council) grant and the resources of the ANU Research School of Chemistry, Janet DeBoos and research assistant, Tony Flynn, are engaged in a project examining the stability of barium glazes under a range of applications, firing conditions and temperatures. The outcome is expected to develop guidelines for the formulation of safe barium glazes. The current research is seen as exploratory rather than definitive as no guidelines exist at present for safe barium leaching levels from barium glazed pottery.

We ask other researchers in this area to exchange information as it appears that there is no formal research being done. The Center for Safety in the Arts in New York web site has had no responses to a request for any research information on barium glaze stability. We have also initiated discussion through various specifically ceramic internet sites.

All the glaze tests have now been completed. The testing procedure for leaching the barium from the glaze and the consequent analysis of the leaching solution for barium ions has commenced. The AAS (atomic absorption spectroscopy) will be carried out by Mrs Rena Chao of the Research School of Chemistry. Subsequent to that, analysis of the results will be made and will be presented at the Eighth National Ceramic Conference to be hosted by ANU Canberra School of Art Ceramics Workshop in July, 1996. The gradient furnace that was built specifically for this project had some problems that were not anticipated in terms of its firing behaviour; it is expected that a short paper describing these and their solution will also eventuate from this project. The kiln was built to a plan published by the CSIRO and to help subsequent users of these plans, Tony Flynn's detailed testing of firing schedules will be made available.

The results of this research will be published in a booklet form available from Janet DeBoos, Ceramics Workshop, Institute of the Arts, Australian National University, GPO Box 804, Canberra, ACT 2601 in mid-1996. Extracts will also be published in international ceramic journals such as *Ceramics TECHNICAL*. Any further information or queries should be directed to the same address.

**Illustrated: Pouring vessel by Janet DeBoos. Stoneware, barium glaze.*

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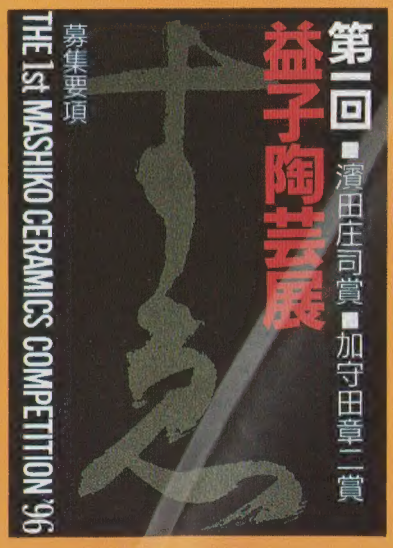

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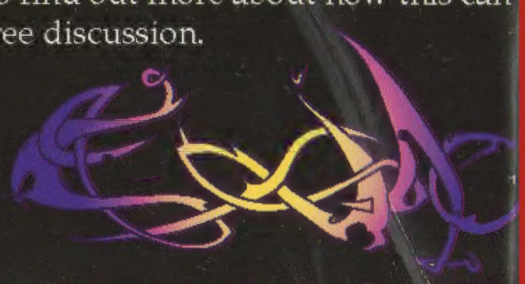

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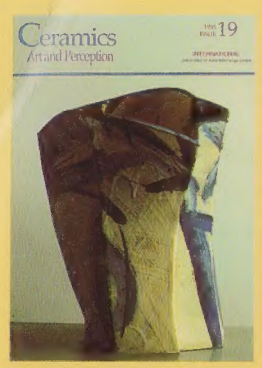

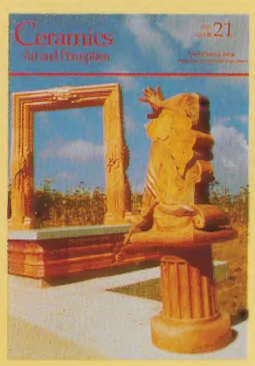

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